THE FOUNDRY

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The Basic Furnace for Malleable Iron.

By E. C. WHEELER.

The question of producing a thoroughly uniform malleable casting is one of great moment, involving as it does many seemingly intricate problems, and the solution of which (by the ideas already advanced and constructions anticipated) it will be admitted is not very satisfactory. It is recognized that the cupola and reverberatory air furnace do not guarantee the metal wished for, and reasons for said deficiencies are known to all careful observers of their respective workings. The metal in a cupola being in direct association with the reductive agency, becomes an absorbant, and while in this condition impurities of the fuel are taken up by the metal. The metal in air furnaces having an oxidizing flame upon it, for continued periods, after being tapped does not allow the same physical characteristics to prevail throughout heat. In both of the above mentioned methods of reducing initial pig iron, there seems absolutely no chance for the elimination of objectionable impurities, but rather the feature is presented of further increase. There is no bad or worthless pig metal, there is some place for it all. This statement must not be construed into meaning that malleable metal may be produced from any class or grade of iron, but that the metallic oxide of iron is as pure in a high No. 6 with its high portion of sulphur and a No. 1 foundry with its high phosphorus, as in the finest grades of bessemer or open hearth pig irons. If some method were feasible whereby these lower irons might be freed from their troublesome burdens, it is believed that the road would be open, for their ready adoption into fields now closed on account of these impurities. There has been a movement in this direction, and which, like all radical changes in foundry practice has met with a great amount of criticism from those best situated to acknowledge the worth of same, and this has been the adoption of the Siemens-Martin type of acid open-hearth furnaces for malleable, by several very prominent concerns. This furnace and this idea have always raised a great cry in the malleable industry, just why this should be is not clear, for its productions have earned no small reputation. The metal, however, has not been advanced to such a degree of proficiency that the successful casting of small shapes has been accomplished, rather its field so far has been more in the line of heavy work casting. There have been many heats where the metal would have poured the very smallest shapes, but this, of course, has been the exception. Therefore, the field of progress in this direction is comparatively new, and yet, though in its infancy, its shortcomings are so pronounced and being with small chances for redemption, the casting world is alive, and anxious for the advent of a furnace which will combine its good qualities with some radical improvements for its poorer ones. A divergence of methods in any industry is accepted only after exhaustive experiment, for with all this present rush of business, and the ready money available, there is no great incentive offered, which would affect readily the conservatism prevailing in the malleable iron business of to-day.

The adoption of a basic lining and fluxes for either the air furnace or open-hearth furnace is advocated for the casting of all heavy railroad shapes, where the one great feature of uniformity is so prominent, and which do not require the maximum fluidity of metal. In foundries where the tonnage per day is from 60 to 100 tons the open-hearth type of furnace ought to be accepted as most practical and economic. This furnace is not an experiment in the malleable business, there are many of them in use, and the idea is here presented to change same from the acid type to the basic. The advantages to the iron from a chemical and physical standpoint are only too apparent. It is the supposition that the dolomitic and magnestic lining and fluxes will so permeate the metal in bath that their influences will have no uncertain or deleterious effects,

rather the resulting product will possess every advantage claimed in this advancement of ideas. The acid type open-hearth as used for malleable to-day does not produce a metal which varies radically from the reverberatory air furnace product, excepting perhaps the one feature of its being lower in total carbon, and hence more malleable, and also, the reducing to a minimum of chance to absorb impurities from the fuel. The main advantage in this style of furnace has been the rapidity with which carbon may be combined, thus making it possible to pour castings of large diameters, avoiding all chances of same being mottled, and therefore weak. In the casting of draw-bars this is indeed a very essential point. A curious phenomenon, and about which is centered a great many doubts and surmises, is that when metal is finally annealed the carbon is in the graphitic form, same as original pig iron, and yet if this metal before annealing should contain appreciable quantities of graphitic carbon, the resulting metal would be worthless. This may be explained by reason of the fact that whenever graphitic carbon is in evidence it is always a controlling influence, preventing to a certainty the possibility of further chemical and molecular change.

This is true of the original pig iron as in matter of castings. Successful malleable iron can never be made when castings are gray or mottled in the "hard" iron. Gray iron castings when run through the malleable anneal are always burnt. There is nothing present to prevent this, as long as the carbon is in combination with the iron. There is absolutely no danger from firing, when the chemical and molecular change or transition has taken place in the metal, continued firing invariably burns or overanneals the metal. Very often metal is burnt in annealing in exactly this manner. In this proposed basic furnace whether it be air or open-hearth types the one great aim is to offer a metal which shall be consistently uniform, and all metallurgists will recognize the significance of this statement, that, in present constructions, this is not always possible, through the intervention of many destructive agencies. The cause for said defects have in turn been attributed to the effect of every metalloid contained in pig-iron, for in some localities the carbon has been too high, or excess of phosphorus has produced hardness, or again the sulphur has been high, manganese too low, or not enough silicon. When a doubt has arisen about the certain and absolute percentage of any alloy, concerning its effects for good and evil, the point of safety for same is generally reached only after exhaustive chemical research. But there is always a reasonable doubt that this very identical point has been established, through the aid of some other alloy, whose influence may not have been appreciated at the moment and therefore not taken into account. If this is not so, why does irregularity in furnace working continue, after the factor of safety is known, and calculated for every heat?

It must be admitted by every thoughtful producer that it is simply a metallurgical impossibility for one concern to base all its faith in malleable upon a certain established limit, for example phosphorous, and another concern to hold strictly to silicon, or sulphur or manganese, and, disregarding all other companion metalloids, offer the same class of material to consumers. That different concerns following divergent lines in working, produce successful material is a fact, but the reasoning of same is immediately negative, for they are reaching their conclusions by the disregard of some dominant associate influence, without being aware of its prominence, and effects. This must be a patent truth. It is often said that no two furnaces work exactly alike, but this is purely and simply a heat condition, and no reasonable deduction that a radically different chemical formulae is required. Must we retrograde to the days when chemistry was an unknown quantity in the malleable industry, and when furnaces were charged with No. 1 iron, and tapped only when iron showed white? Without the aid of chemistry the pioneers in the malleable trusted to a natural course of evolution in the metal to accomplish their desired ends, and how well their expectations were realized is a matter of history. The malleable industry has assuredly made great strides since those days, and is as yet very young in the business. This latter is very prominent by the lack of literature on the subject. In its companion metal, steel, there is not the slightest deviation in chemical ideas and formulae, if methods vary, it is only so because of the differing local constructions. The practice is universal. It is following

these above mentioned facts that the basic furnace seems a possible outcome for the future, to manufacture as nearly as is practicable a chemically pure iron, which after annealing will not allow of the many changing aspects of the modern metal. The loss (by absorption) of the impurities cannot but make the iron that soft, pliable metal so eagerly wished for. The physical properties will be enhanced greatly for the iron will have shaken off its parasites, and, being free will no doubt find many markets opened, which to-day are closed on account of the uncertainty regarding succeeding heats. In considering this question of uniformity the fact must be faced that, in any of the casting industries metal to be strictly alike throughout a heat, must be removed from furnace influences in bulk. In a few words the metal must be tapped into some large receptacle, away from all possible chance of further chamical and molecular actions. In a Siemens-Martin acid open-hearth, which it was the privilege of writer to operate for some little time, malleable iron of great uniformity and ductility was produced. The metal was handled in a rather unique way, owing to the fact that peculiar conditions existed making it impossible for the molders to catch iron at furnace spout in the usual manner.

The metal had to be carried about 200 feet before reaching the molders' floors. The method which suggested itself was to tap the entire heat into a ladle attached to an overhead traveling crane, and when the molders' floors were reached, the ladle was tipped and its contents poured into small ladles. The experiment was tried of pouring from the bottom of ladle, but this way of tapping from bottom allowed the top to chill, to such a degree, that skulls were frequent and annoying. Tipping the ladle and allowing all metal to come from top, maintained the metal the same heat throughout. The one prominent feature was that this metal was uniform, and whether the initial mixture was all that could have been desired might be a matter of opinion, but the resulting metal, whether or no, was the same all through heat. The shrinkage was very uniform. This method of handling was therefore a great success from one point of view, for it was possible to produce a consistent metal as regards the heat conditions during pouring, and subsequent cooling, although it did not present any radical advantages over the reverberatory metal, with peculiar reference to the elimination of deleterious metalloids. They were all there, and in the same quantities. The question naturally arises that if this Siemens-Martin furnace had the prepared lining and fluxes of the basic methods, whether the metal would not have had all the advantages herewith claimed. The claim is here made that malleable castings produced under basic conditions will anneal in three days' firing, and will contain many essential features now lacking in present methods. It is possible to refine pig iron to any degree desired if the selling price will warrant the outlay, but it is not possible to so influence the native ore, charged into blast furnace, that after the burden has passed the fusion zone, and the iron has dropped to the hearth, that the metal will be a strictly desirable article. Many ores are roasted before charging to remove the sulphur, but the other impurities remain. Pig iron as cast is most uneven in quality, succeeding casts vary and it is no wonder that difficulty is experienced in the casting arts to produce uniform metal. If pig iron were freed from its harmful agencies, it is believed that the casting art would be advanced fully 50 per cent. We hear from all sides of the harmful effects of this or that metalloid, that phosphorous "hardens," sulphur "shortens," manganese "stiffens," silicon and carbon working together in certain ratios affects the physical strength. If these elements were removed, the iron would in a great degree develop qualities now latent, through lack of opportunity to expand. Blast furnace, and remelting or refining methods have not reached their limits by any means, but there does seem to exist a lull in their advancement, and at a time, too, when a change would seem from a buyer's standpoint most opportune. With a basic furnace for malleable, would come a revelation as to the metal's possibilities. If the basic idea should be entertained with any degree of encouragement by malleable concerns in general, there would be possible a great change in foundry construction, which would remove from foundry interiors all melting furnaces, as the latter could be erected outside buildings, with only tapping spouts projecting through the walls.

The metal could be tapped into previously

heated ladles of a size sufficient to contain a whole heat. These ladles would run upon tracks parallel with furnaces. After tapping, which would take, for 8 or 10 ton heat, about two minutes, the chargers would start immediately to re-charge furnace, and same would be on its way re-melting before previous heat was all poured. If a concern was melting 60 to 100 ton of metal per day and each furnace was melting three heats, there would be a furnace gain in melting of 45 minutes per heat, or 2¼ hours per day, which would go a very considerable distance toward melting third heat, during a working day of 10 hours. With a basic open-hearth a 10-ton heat may be charged in fifteen minutes. This has been frequently accomplished, and the apparatus at hand was not of the very advanced construction either. This proposed method of handling the whole heat in one ladle is nothing new, therefore no experiment, and it is thoroughly practical.

The Foundry Equipment of the U. S. Naval Repair Ship "Vulcan."

At first thought the idea of a foundry operating in full blast at sea would seem to be more of a novelty than an example of good practice. During our recent scrap with Spain it became necssary to furnish the fleet under Sampson with repairs, and to facilitate this a vessel fitted out with a foundry and machine shop was placed at the admiral's disposal. Gardiner C. Sims and Wm. S. Aldrich describe this addition to the navy in the Engineering Magazine for June, and through the courtesy of this journal we are enabled to offer our readers an insight into what is probably the only foundry of its kind.

Before the late war, the Engineer-in-chief of the Navy, Rear Admiral George W. Melville, U. S. N. brought to the attention of the Secretary of the Navy, "the desirability of making such preparation for the fitting out of a vessel which would be a floating repair shop as would enable the work to be done with great rapidity when needed."

Fitted out with the most approved workshop appliances, with a large and varied assortment of engineers' and ship's stores, and a picked complement of skilled mechanics, the Vulcan was pre-eminently an "engineer's ship." The project was in no sense an experiment. Had it been looked upon as such, it passed beyond the experimental stage in less than twenty-four hours after reporting for duty to Admiral Sampson.

The Chatham, now the Vulcan, was the sister ship of the Berkshire, built by the American Ship Building Co., of Philadelphia, in 1884. She was well designed, strongly built, and for years had been a credit to the early work of this company. The original interior arrangements seemed to be particularly adapted to meet the requirements of her new line of service in the auxiliary navy. On each deck were ample gangways on each side of the engine house, and large cargo ports on each side, two forward and two aft. These gangways greatly facilitated supervision, and permitted of an extension of the shop work from stem to stern, all on one deck, to be fitted up and thereafter known as the "shop deck."

The head room was 7½ feet between the shop deck and the deck beams above. Belts from line to counter-shafts and all other athwartship belts were in the way of standing erect under them, but did not seriously interfere otherwise with working the machine tools. This available head room below belting varied somewhat according to circumstances, but the projecting adjusting screws of the hangers proved much more exasperating. Officers and men, however, became accustomed to dodging both.

The installation of the forge blower and hot-air exhaust system was employed. The former was a "Monogram" Sturtevant blower, with 7-inch discharge driven from the forward line of shafting; and the latter was equipped with a standard Sturtevant exhaust fan, with 23-inch discharge, and driven by a 3″ x 4½″ engine. New England mechanics, working nine hours a day, 'tween decks, off the south coast of Cuba, in mid-summer, required all the fresh water and air they could get. The next best thing to the forced circulation of fresh air was to have all of the foul air and smoke from the forge fires exhausted, and this arrangement proved of inestimable value.

A foundry at sea had not been heard of before the cruise of the Vulcan. Whatever other kinds of naval repair work had been executed heretofore on board ship, that of making large brass and iron castings had not been attempted. In her facilities for this new line of work the Vulcan stands pre-eminent and alone. That the unique

equipment for foundry work was successful is more than shown by the fact that thousands of pounds of iron and brass castings were made and finished for the ships of the fleet. The brass furnaces were kept in almost constant service, sometimes running off two heats a day, and making it necessary to carry the work far into the night, much to the discomfort of the men, who were trying to get some sleep and rest before another day's work. In iron casting not more than one heat was run off in a day, and that usually about 3 o'clock in the afternoon. For after filling the molds and dropping bottom, it was practically impossible to do much more in that part of the ship till the next morning. Kipling has sung for the Scotch engineer and stoker, but there was no heaven-born genius on board the Vulcan to treasure up the memories and scenes incident to dropping bottom. The usual luxuries of such work ashore were entirely missing. Like the fiery furnace of old, the heat seemed seven times more intense than it was wont to be ashore.

U. S. S. VULCAN FITTING OUT AT BOSTON NAVY YARD.

The foundry floor was made by cutting away the three-inch wood planks of the shop deck to the steel deck-plates below, laying down one-half inch asbestos board and then filling in to the original level of the deck with concrete, mixed in the proportion of one part of Portland cement to one and one-half of sand. Directly beneath the cupola a fire-brick floor was laid in cement on the asbestos board, and a cast iron foot piece placed in the center to receive the bearing bar of the cupola bottom. It was rarely possible to get all of the flasks on such of the space as might be available of this 16x16 ft. foundry floor. Many of the molds had to be poured on the wood deck surrounding it, a liberal supply of water and of wet sand being kept in readiness for any emergency.

The cupola had a melting capacity of from 3,000 to 4,000 pounds of iron an hour, or a total capacity of five tons, being 27 inches inside diameter. It was charged from the deck above the foundry floor, as shown in Fig. 1. In the same view will be seen the No. 5 Sturtevant cupola blower, supplying an air blast through 9¾-inch discharge pipe, of from 4 to 12 ounces pressure, according to circumstances. The time required for a heat was usually about forty-five minutes, from turning on the blast till pouring ceased. Whenever the cupola was operated fire pumps were kept running, and men stationed at the fire mains with hose and buckets ready for any emergency. On the spar deck and topsides bucket men were also stationed, to guard woodwork, rigging, sailcloth, etc., from the sparks of the cupola.

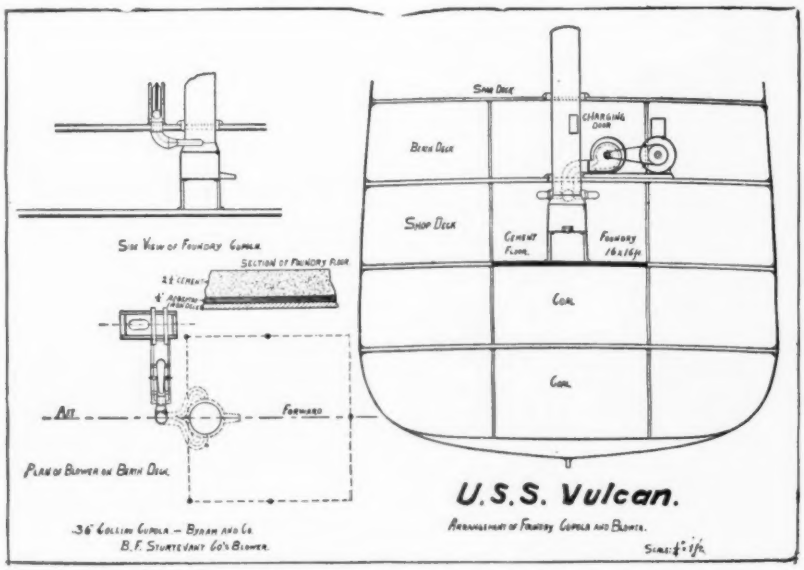
There were two brass furnaces, 12″x12″ and 16″x16″, inside lining, respectively, lo-

cated on the foundry floor, on the starboard side of the cupola, as shown in Fig. 2. They had each a separate stack, placed aft of the cupola and extending a short distance above it. The total height of all of these stacks was about 33 feet above the foundry floor.

The intense heat from the brass furnaces and stacks, and from directly over the cupola tap hole, proved the most difficult problem with which we had to deal in this part of the Vulcan's equipment. The whole wooden deck above the brass furnaces and the foundry floor was protected by asbestos board, overlaid with tin. Sheet iron was placed between the deck-beams above the tap hole, giving about eight inches of clear space between it and the wooden deck above for the free circulation of air.

A heavy covering of asbestos was placed around the brass furnaces and the foundry cupola. In the latter case it was extended from the bottom of the 37-inch shell of the cupola to the topsides of the ship. The stacks of the brass furnaces were lined with cylindrical fire-clay pipe, with cemented joints throughout their whole length. Free circulation of air was allowed around all of these stacks by cutting away the wooden decks and fitting with ample coamings. This proved entirely satisfactory for the cupola. It was found necessary, however, to open up more and more the air space around the brass furnace stacks. The horizontal and inclined portions of these stacks, just below the berth deck, were provided with heavy asbestos coverings to further protect this deck from the excessive radiation of heat.

In addition to the foundry equipment above described, there was a forge shop, a plant with special arrangements for removing the smoke, and preventing the overheating of the space between decks. This arrangement consisted of a large steam fan and a system of exhaust piping, installed by the B. F. Sturtevant Co., whereby large volumes of air were continually exhausted through the forge hood pipes, thereby securing the double result of cooling and ventilating the space. In the matter of making this space comfortable for the workmen, it is stated that "this arrangement proved of inestimable value."



ARRANGEMENT OF FOUNDRY CUPOLA AND BLOWER.

Incandescent lamps were fitted throughout, in store rooms and on the shop deck, in addition to those which had been originally installed, and arranged to suit the conditions of the work. Three long-burning enclosed arc lamps were placed in the machine shops. With glaring forge fires and brilliant arc and incandescent lights, we were no doubt nightly exposing ourselves to Spanish Mausers off in the mountain passes and lying low in the rifle pits around the shores of Guantanamo Bay. The first night of our work we were ordered to put out all lights.

It soon became apparent that the Vulcan would never get through with the work unless allowed to work at night.

After many days we had learned by experience the specialties of all of the men. Only then was it possible to assign them to work and duties for which they were more or less thoroughly adapted. The following classification is not according to navy enlistment papers of these men, but according to their several abilities as determined after two months' experience with them:

Machinists ....39 with 11 helpers.
Boilermakers ....25 with 2 helpers.
Blacksmiths .... 5 with 2 helpers.

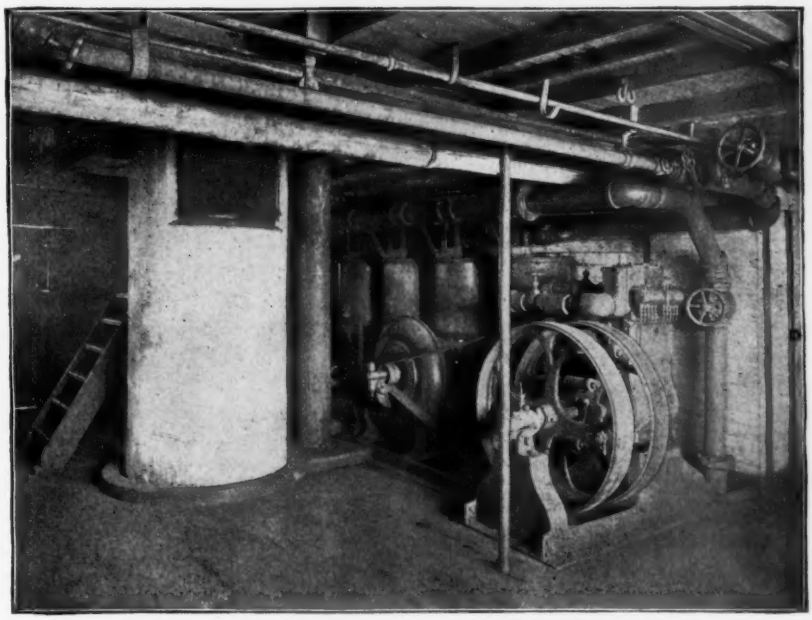


FIG. 1—VIEW OF FOUNDRY CUPOLA AND BLOWER ON BERTH DECK.

Coppersmiths .... 5 with 1 helper.
Pipe-fitters .... 4 with 3 helpers.
Molders .... 4 with 1 helper.
Electrical machinists 2
Pattern-makers 3
Carpenters 2

Summary—

Workshop force, 89 with 20 helpers.....109
Engine and fire-room detail..... 30
Engineers' yeomen 2
Cooks 7
Ship's crew of the Vulcan..... 70

Total 218

The Vulcan arrived off Santiago de Cuba just in time to witness the operations along the shores of Aguadores, three miles east of Morro Castle. There were two six-pounders forward, and we tendered our services to Admiral Sampson. He reminded us that gunboats and battleships would do the fighting, if there was any to be done, while our sphere of activity was elsewhere. After reporting to the Admiral the Vulcan stood towards the shore, almost under the brow of Morro, so close, in fact, that the Admiral signalled the Massachusetts to bespeak the Vulcan as she rounded to, to keep farther off shore. The Vulcan changed her course, bespoke the Captain of the Texas, as he was wetting down the decks and clearing ship for action, and returning farther out to sea, bespoke the Newark, and left the scene of action for Guantanamo Bay. This was the first, the last, the only smoke of battle enjoyed by the Vulcan.

The division of the working force into three shifts was maintained only so long as it was absolutely necessary in order that the early rush of work might not accumulate. Those men who were obliged to rest and to sleep at night could get very little of either on account of the noise and the lights. Those obliged to sleep in the daytime fared no better, with noise and disturbances on

every hand. The conditions surrounding the men on board the Vulcan were as different from those on a regular naval vessel as could well be imagined. Of course, the work goes on, but long lines of shop shafting, blowers, and hot forges with the accompanying noises of work in forging, boilermaking and machine shop, are not kept in full operation seven days of the week throughout the twenty-four hours. There was no place for the men to rest—no rendezvous, such as they had been accustomed to on shore. The work was continuous, for eight or nine hours, or more, as necessity demanded—quite different from the customary four hours on duty and eight hours

pattern and core boxes for the double-valve of the Vixen (17, 18, 19), for instance, were made at one stretch, without rest or sleep for the pattern-makers, till all was ready to hand over to the molder.

The pattern for the valve-seats for the New York (10, 11) was made from a carefully-executed pencil sketch, furnished the Vulcan. The pattern for the rock-shaft for the Helena (14) was made from a blue print, also furnished for the purpose. All of the other patterns shown in Fig. 3 were made from the original articles sent aboard the Vulcan as samples, and this was the usual practice followed in making patterns for such new parts.

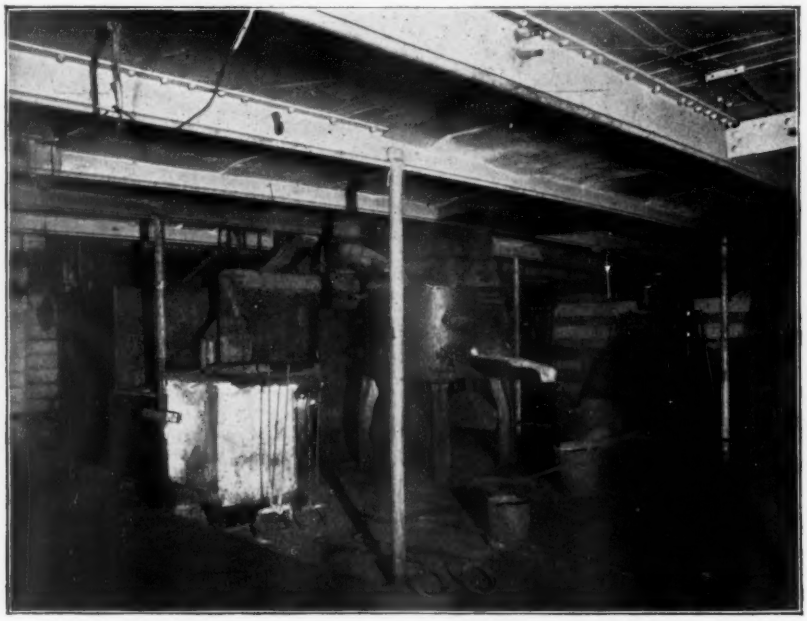


FIG. 2—VIEW OF FOUNDRY EQUIPMENT ON SHOP DECK.

off in the regular service. As soon as possible, therefore, the men were divided into two shifts, giving all hands eight hours of rest and quietness.

The group of patterns, Fig. 3, is thoroughly representative of the wide range of work called for in the line of brass castings. Perhaps they illustrate methods of pattern-making and seem to dictate molding practice slightly at variance with established rules, but the conditions under which they were rushed through must be kept in mind. The core boxes seem to show rough-and-ready construction, but these had to be at hand when the patterns were finished. The

White-metal patterns were made frequently from the first wood pattern, when several spare parts were ordered. This is shown in the case of valve-seats for the New York (10, 11), of which a requisition for thirty-six was filled. The requisition for the plug cocks for the Oregon (4, 5), called for nine castings only, to be afterwards finished by the machinists of the Oregon in their own shops; and these were not to replace any broken parts. A six-inch Spanish shell had penetrated the Iowa, on the starboard bow, a little above the water line, and exploded about 12 feet inboard, where it struck an

armor hatch on the berth deck. There were at least three hundred holes in the thin steel deck and bulkheads in the vicinity of the explosion. Fragments of the shell passed through, as the armor hatch was blown off, and started a fire on the protective deck below. The Vulcan made an entirely new hatch cover and coaming with all fastenings and trimmed around the ragged edge of the deck, and inserted a new piece of plate. replace broken or damaged parts and detent triggers of turret guns fitted with new steel blocks.

In the first forty-one days of the Vulcan's work in Guantanamo Bay, there were 528 orders for repairs filled and 256 requisitions for supplies.

The Ross-Mehan Foundry Company, the Mountain City Stove and Manufacturing

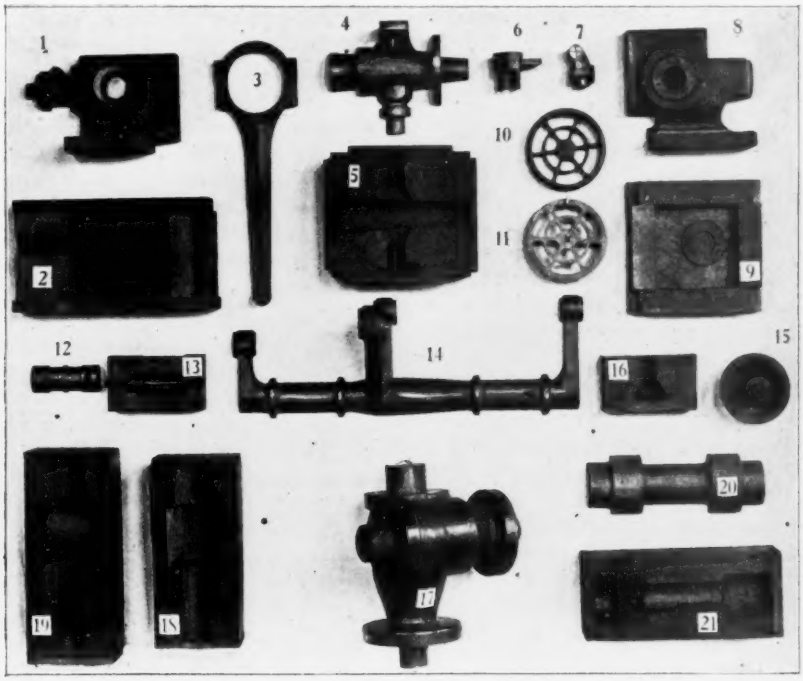


FIG. 3. GROUP OF TYPICAL PATTERNS FOR CASTINGS AND REPAIR WORK FINISHED ON BOARD THE U. S. S. VULCAN.

1, 2. Pattern and Core Box for Crosshead of Ice Machine, U. S. S. New York. 3. Pattern for Eccentric Rod and Strap for Willan's Dynamo Engine, U. S. S. Gloucester. 4, 5. Pattern and Core Box for Plug Cock, for U. S. S. Oregon. 6. Pattern for a small valve, to be fitted with loose stem, representative of large class of repair work. 7. Pattern for Rod Clip of Auxiliary Pump, U. S. Torpedo Boat Rodgers. 8, 9. Pattern and Core Box for Dynamo Engine, U. S. S. Massachusetts. 10, 11. Wood and Metal Pattern for Valve Seats, U. S. S. New York. 12, 13. Pattern and Core Box for Supplementary Steam Valve, for Auxiliary Pump, U. S. S. Indiana. 14. Pattern for Rock Shaft for U. S. S. Helena. 15, 16. Pattern and Core Box for Valve, for U. S. S. Newark. 17, 18, 19. Pattern and Core Box for Double Valve, for U. S. S. Vixen. 20, 21. Pattern and Core Box for Hydraulic Piston, for U. S. S. Indiana.

In the line of ordnance work, gun mounts were made for the new six-pounders sent down to be mounted on the small converted yachts, alterations were made in old gun mounts, new foundation plates were made for others; and in one case an entirely new bronze casting was completely finished for replacing a cracked gun-mount bracket. Firing pins, gun springs, etc., were made to

Company and other iron and metal working industries are in serious straits for lack of enough molders and workmen. Orders they have in plenty, the great problem now being how to secure men enough to fill them. Chattanooga (Tenn.) Times.

The stove foundries of Allegheny County are said to have been combined under the

name of the Pittsburg Stove and Range Co., with a capital of $2,000,000. Application will be made for a charter under the laws of Pennsylvania. It will embrace A. Bradley & Co., Graff & Co., Bissell & Co., and Baldwin & Graham, of Pittsburg; Anshutz, Bradberry & Co., DeHaven & Co., Crea, Graham & Co. and Voegtly & Co., of Allegheney, and the Walters Stove and Range Co., of Sharpsburg. All the properties have been appraised and the prices for the plants have been accepted. The new combine will be ready to do business in a short time. A meeting of those interested will be held in a few days, at which the officers will be elected. Under the new order of things, each concern will lose its identity. It is expected to shut down five of the nine foundries as soon as the details are complete. The other four will be run to their fullest capacity. The promoters are of the opinion that the four plants will be sufficient to supply the necessary demand. There is to be one central office and all the business interests are to be concentrated.—Pittsburg Leader.

Light on a Dark Subject.

Editor THE FOUNDRY:

A letter on page 244 of the July FOUNDRY, written by Sam Due, needs a few points of correction. First, the letter is hardly logical in itself. It begins by saying that every indication points to the fact that the plumbago prices are controlled by the importers of plumbago, assisted by the manufacturers of crucibles. To state this in this way is to answer it, as no sane manufacturer of crucibles would co-operate with anyone to put up the price of his raw stock, that would go without saying.

Then he further adds on page 245 "Plumbago has been advanced by the importers 100 per cent. and the crucible makers in self-protection are compelled to advance crucible prices." This seems to be more or less a contradiction of the previous statement, in which the crucible makers were put down as fellow-conspirators with the importers of plumbago.

The real truth, however, is as follows: All crucible plumbago comes from the Island of Ceylon in the East Indies. Two years ago this Ceylon plumbago was sold at about or even less than the cost of production. All the easy mining of plumbago has gradually grown to be a thing of the past. Plumbago ore is scarce and growing scarcer, and is very, very much more difficult to mine than ever before.

Next, the uses of plumbago have largely increased; again, at this particular time, the entire machine using and machine making world is abnormally busy, busy as never before, so with a growing scarcity at Ceylon comes the multiplied demand, both from all Europe and all America. The importers have had nothing whatever to do with advancing the prices. They make no more now than they did before. Their function is to transfer ore from the Ceylon miners to the consumers, for a commission. The fact that the demand is very large and the supply more or less short, has little by little lifted the price until prices are not as Sam Due puts it, 100 per cent. above normal, but between 300 per cent. and 350 per cent. above the prices of two years ago.

In all this the crucible makers have been sufferers, they have had to take this medicine or shut up shop, and while the plumbago has advanced for the above reasons to over 300 per cent., no crucible maker so far, has advanced his price over 100 per cent., or in other words, while paying more than 300 per cent. advance for his ore, he has not advanced his crucible prices over 100 per cent.

Before this unprecedented state of affairs came to pass the crucible business was more or less non-dividend paying, prices were far too low. The hard times and excessive competition had driven them down to about the cost of production and some of this recovery in price is due to the desire on the part of the crucible makers to have their business an average paying business. The scarcity of plumbago, coupled with its high price is something that is likely to continue. The writer is just from London where he saw the leading crucible maker of England, who had just returned from Ceylon, having visited all the mines. Mr. Walker also saw in London, all the importers who have mail connections by every steamer with Ceylon, and the facts as above stated may be put down as the latest there is to be said on this subject, up to date, and put down as facts that can be verified.

JOSEPH DIXON CRUCIBLE CO.,
JOHN A. WALKER, Vice-Pres.

THE FOUNDRY

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We can not furnish a continuous set of back numbers beyond the current year.

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Trade Outlook.

Some surprise has been manifested that the iron manufacturers of the country have not more readily responded to the demand upon them. In this connection it is well to bear in mind that most all of the paying ore properties in the Lake Superior district as well as those in the southern field, have gradually been bought up by large plants who produce pig iron largely for their own use. The output from furnaces would undoubtedly be much greater if ore could be readily obtained.

New mines are being opened, some after having been closed for many years, but the process is necessarily slow. Neither does capital take kindly to investments in properties that in all likelihood can only pay dividends during a boom period. It is not so much a question of finding ore, as it is to find it in paying quantities, and in such places that transportation and other charges shall permit competition with older properties.

The last rise in pig iron has not produced a ripple in the trade. While it is true that a few orders have been withheld because the intending purchasers thought prices were too high, these are wholly insignificant in the great volume of orders constantly being booked and the great urgency of foundries for iron even to keep running.

As has been the case for some weeks, much of the pig iron being ordered is for delivery in the first half of 1900.

From every point the news is of the same character. In the St. Louis district many enterprises, especially the stove foundries, are enlarging their works to meet increased business. Philadelphia reports a shortage of cars and difficulty in moving iron to the seaboard. In Pittsburg foundries are refusing orders right and left. One order for 400 tons of castings has been peddled about for several weeks, which none of the local foundries can fill, which shows how busy they are. In Buffalo furnaces report more iron sold into the next year than in any previous year. Cast iron pipe has been further advanced, under the strength in the iron position.

The whole situation on foundry pig iron continues to exhibit remarkable strength, with prices advancing. There is very little spot iron to be had, except a few speculative lots, the possible instance of a furnace just gone into blast, or a rare case where some change in a delivery has taken place. Dealers are troubled more about deliveries and keeping their customers going than about selling iron.

One Effect of Consolidation.

In the eyes of many the consolidation of a number of plants in a given industry is synonymous with an increase in the price of their product. This is, to say the least, misleading, because a combination only avoids competition by selling its goods at a minimum profit.

As tending to show the trend of one of the latest combinations in the iron trade we quote the following from an eastern paper:

"The consolidations which have been effected in nearly every branch of the trade have resulted in many concerns being galvanized into activity which before were either actually inoperative or runninng only spasmodically. In the case of the concerns composing the Republic Iron & Steel Company that is particularly true. As is well known, this concern took over about thirty-five of the leading bar-iron mills in the West and South, many of them not having been on a paying basis for years. This was owing to different causes, principally that

some of the mills were badly located, others were short of working capital, while some concerns had not recovered from financial difficulties of years ago. The organization of the Republic Iron & Steel Company has put these concerns on a better financial footing. Mills that are better adapted to manufacturing one or two kinds of product will be kept on those lines of manufacture, and the business so centralized among the different mills that it is believed nearly all the properties taken over can be operated at a profit. It is proposed to manufacture iron bars on a very large scale at Youngstown, where the Republic Iron & Steel Company have three mills, these being the Andrews Brothers Works, Brown-Bonnell Works and the Mahoning Valley Works. They are fairly modern bar mills, but a good deal of money will be spent in new equipment and the plants will be brought up strictly to date. The Republic Iron & Steel Company, while regarded perhaps with less favor than any of the other consolidations made in the iron trade, have entered some very large orders and are operating their mills to full capacity and at very profitable prices."

Some Newer Figures.

Statistics always form a never-ending source of argument. The only thing which upsets statistics are conditions. These change and with them any arrangement of figures looses its value.

George H. Hull, of the American Pig Iron Storage Warrant Company, said recently in the North American Review that 50 years ago 100 pounds of iron were consumed in the United States annually for each one of its inhabitants. Ten years ago this had increased to 300 pounds annually, and to-day we are consuming at the rate of 400 pounds to each person. It is found that an advance in the price of pig iron, ranging from 100 to 300 per cent, took place in 1854, 1864, 1872, 1880 and 1889, and that each of these years inaugurated a period of depression. In 1854 iron advanced from $19 to $50 a ton; in 1864 from $18 to $75; in 1872 from $35 to $60; in 1880 from $20 to $45, and in 1889 from $9 to $17. To-day iron which sold a few months ago at $6 a ton is $12, and there is an advancing tendency, with less than six days' supply in sight.

Mr. Hull finds that for the past ten years the average stock of iron carried has been less than a twenty-three days' supply. This apparently small stock is blamed for the rapid rise of the price of iron under increased demand. Mr. Hull suggests as a remedy that we should follow the example of Great Britain and establish warrant yards, which in that country keeps stocks up to a six months' supply. It is the opinion of Mr. Hull that if we, too, should put iron on the exchanges, the result would be a six months' supply always on hand, with no likelihood of the abnormal advances which have marked previous years as well as the present one.

That Mr. Hull must be somewhat mistaken in his favorable opinion of the British warrant system we quote the following from the Iron and Coal Trades' Review (London) of July 14:

"There is every indication that the strong tone which has prevailed in the pig iron trade for so long past will remain characteristic of business for some considerable time forward. A further rise has occurred this week in the price of Cleveland pig iron, making it higher than it has been for 27 years past, while it is 30s. per ton higher than it was a year ago, and by no means unlikely to advance another 10s. within the next few months. A feature of the present trade position has been its steadiness, for although, owing to a variety of causes, prices have now and again skipped forward, the net result has been a long and steady advance with only a few trifling set backs to counteract the prevailing tendency. Rubio has risen in price and East Coast hematites are now quoted up to 75s. per ton, but in this case the rise has not been so considerable as in that of No. 3 pig, and the difference in prices between the two makes it less than it has been for a long time past. In Barrow a steady trade is being done, and mixed numbers are being quoted at 76s. per ton, while ore prices are moving upwards. On the Manchester market business continues to be hampered by the smallness of the tonnage offering. Demand is full, but stocks are depressed, and makers find it impossible to entertain enquiries for prompt deliveries. Throughout the South Staffordshire district the scarcity of coke and the high prices charged are causing serious inconvenience. Demand for pig iron is far in excess of the supplies, but makers continue to postpone the lighting of new furnaces, preferring not to risk the expenses thereby entailed, while

any uncertainty exists as regards the continuation of the present conditions. Scotch makers are very busy. The exports of pig iron for the past month show a notable increase, and are much higher than those usually shipped during June."

Chinese Foundries.

More than a year ago we published some accounts of the foundry business in the Celestial Empire. The reader will recollect that there was very little about it which would recommend itself to this part of the earth. We have taken the following from the Hartford (Conn.) Globe:

The primitive methods employed by the Chinese in their native foundries are set forth in an interesting form in a description of an iron foundry at Haun-Kioa (Han-Kow) by a writer in the Celestial Empire. "The furnace," he says, "was very simple in construction, being made of clay, in three sections. The lowermost was what might be called the crucible, and was the receptacle for the molten metal, being about a cubic foot in capacity. The middle section was a ring of the same diameter as the lower section, and about eight inches in height. In this was a hole to receive the blast pipe, the blast being supplied by a native 'box' bellows of the usual type. The upper section was another ring about a foot higher.

"I was not fortunate enough," he continues, "to see the putting together of the furnace; when I saw it the operation was begun, and a man was piliing on the last of the charge—scrap, cast iron and coke. One man was then pumping the blast. I waited till I saw the yellow flame begin to show above the piled-up iron, which gradually sank down as that below melted. By and by two men pumped the blast. As the process went on a still stronger blast was needed, so a third man helped at the bellows, and the pumping grew fast and furious, while one workman, wearing an old broad-brimmed straw hat to protect his head and face from the shower of sparks, stirred the glowing mass with an iron rod.

"In due time the melting was finished, the molten iron having fallen through to the bottom section of the furnace. The blast was stopped, the bellows disconnected and the upper and middle sections of the furnace taken off and laid aside. The surface of the molten iron being skimmed of its slag, it was well covered with rice husk ashes. This protected the face of the man who next had to handle it from the intense heat that would otherwise have radiated from the molten iron. This man's duty was to clasp the crucible in his arms, literally hugging it to himself, and to fill the molds previously arranged around. In this he was assisted by a woman, who raked back the ashes where the iron was to run out.

"On this occasion plowshares were the result of the operation, the one charge being sufficient to cast about 20. Almost immediately following this man was another, who took the molds apart and removed their contents. No sooner were the molds empty than the workman set about repairing their inner surface with a black paste, ready for another casting. Upon inquiry I was told that about 50 catties—one cattie equal 13.3 pounds—of iron and 20 catties of fuel constituted one charge for the furnace, and that four meltings were effected in a day's work."

The party who wrote the above had evidently acquired the Chinese way of stretching the truth. It will be noticed that the lower section of the cupola or crucible is said to have had a capacity of one cubic foot. One cubic foot of iron weighs in the neighborhood of 450 pounds. How the Chinese got 50 catties of 13.3 pounds into that crucible is something that will require explanation.

The statement that the Chinese melter or molder clasped this amount of iron in his arms and poured it may also be taken with more or less salt.

Not Accident, but Negligence.

A serious and almost fatal accident occurred at the foundry of the Oakland Machine Company at Oakland late Friday afternoon. Through some flaw in the construction of a large casting ladle, the bottom dropped out, letting the contents, consisting of 250 pounds of molten iron, fall to the ground. The shop crew had been called to assist in pouring the metal, and were all more or less badly burned from the molten iron, which flew like lightning around the room, on coming in contact with the wet ground. The clothing of the men caught fire, and all were forced to plunge into the river, which fortunately was near at hand.—Biddeford (Me.) Journal.

It is difficult to find words strong enough to express one's opinion on an accident such as related above. There is no excuse for

accidents of this kind. Anything which endangers life and limbs should be inspected often enough to prevent such catastrophes. We have seen ladles hoisted on cranes not calculated to carry half their weight, with ropes and gearing in an uncertain condition. Taking it altogether, it is a wonder that there are not more persons injured around the foundries. For absolute recklessness they stand at the head, and most of their accidents are made to order.

A Canadian Canard.

One of our subscribers sends us the following story, wherein the Canadian Manufacturer reports the remarkable phenomenon of the discovery of a flower incased in a hole in an old iron casting, the flower being in a perfect state of preservation. A workman engaged in breaking up old iron at a foundry in Ontario came across an old wheel that had done service on a stationary engine for many years. On breaking it he discovered in a crevice a flower blossom in perfect condition, its color being as fresh as the day it found its way into its mysterious hiding place. It had evidently fallen into the casting when it was being poured, and in some manner escaped injury from the molten metal. As the cavity was perfectly airtight it naturally retained its freshness until exposed to view.

No Molder Should Wear Poor Shoes.

More than half of the burns received in the foundry are directly chargeable to the molder's own neglect in not providing himself with suitable footwear. Laced shoes can be charged with more injuries to molders than any other kind of shoes. A drop of molten iron is just like any other liquid, and will do no material damage if there is no place where it can lodge. Congress shoes without seams offer an almost complete protection from burns caused by spilled metal. The following from the Lowell (Mass.) Sun emphasizes what we have said:

Arthur Pucell, who is employed in the foundry of the Big Shop, met with an accident yesterday which will lay him up for some time to come. A few weeks ago while dipping molten metal from one of the big ladles some of the liquid iron fell on his shoe, burning through the leather and into the flesh of his foot. After the burn had partially healed he cut a hole in an old shoe to relieve the pressure on his sore foot and went to work. Yesterday afternoon he was again ladling iron when through some mishap he again spilled some metal which fell into the hole in his shoe and before it could be taken off the foot was frightfully burned.

A New Foundry Consolidation.

In common with many other industries, the soil pipe manufacturers have consolidated their interests, the new company being known as the Central Foundry Co., with a capital of $14,000,000. Among the plants that have entered the combine the following are reported:

Monitor Iron Works, New York City; J. L. Mott Iron Works, New York City; Henry McShane Manufacturing Co., Baltimore; J. Regester & Sons, Baltimore; A. L. Sweet Iron Works, Medina, N. Y.; Bigelow Manufacturing Co., Medina, N. Y.; Beach & Co., Medina, N. Y.; Midvale Foundry Co., Allentown, Pa.; Phoenix Foundry & Machinery Co., Landsdale, Pa.; Hoffman, Billings & Weller Manufacturing Co., Gadsden, Ala.; Shuster Foundry Co., South Pittsburg, Tenn.; E. L. Tyler & Co., Anniston, Ala.; Alabama Pipe Co., Bessemer, Ala.; Bell Manufacturing Co., Vincennes, Ind.; Rundle-Spence Manufacturing Co., New Orleans; Kingsley Foundry Co., Hammond, Ind.; S. L. Bigelow Manufacturing Co., St. Charles, Ill.; Wilmington Pipe & Foundry Co., Wilmington, Del.; Illinois Malleable Iron Co., Chicago; Ahrens & Ott, Louisville, Ky.; Humphreys Manufacturing Co., Mansfield, O.; A. T. McDonald & Morrison Manufacturing Co., Dubuque, Ia.; Flush Tank Manufacturing Co., Aurora, Ill.; C. A. Blessing, Philadelphia; Foran & Abendroth, Flemington, N. J.; Bartlett & Hayward Co., Baltimore; Jones Hollow Ware Co., Baltimore; Cassidy & Adler, New York City.

The officers are John R. Reid, formerly general manager and treasurer of the J. L. Mott Iron Works, of New York, president; Alfred Fowle, Jr., first vice-president and general manager; Robert A. Regester, second vice-president and supervisor of foundries; G. Schumacher, secretary; W. S. Reins, purchasing agent and assistant to general manager; W. L. Rogers, treasurer.

The Krank's Korner.

When the American Foundrymen's Association held its first meeting in Philadelphia

in 1896, Mr. C. A. Treat, of the C. A. Treat Mfg. Co., Hannibal, Mo., made a little speech in which he said: "Gentlemen, since we have formed an organization of foundrymen for our mutual benefit, don't you think it would be a good idea for foundrymen to stop lying to each other?"

* * *

These off-hand remarks of Mr. Treat made a hit. They hit nearly everybody present. They struck right home. What foundryman could not remember when he lied about his melting and everything else just to keep his competitors guessing?

* * *

The other day I came across a copy of the Connellsville Courier. It devoted part of its contents to extolling the virtues of a certain coke. To attest the truthfulness of what was said about the coke the following figures were attached:

"The C. A. Treat Manufacturing Company of Hannibal, Mo., manufacturers of car wheels, castings and railroad supplies, gives the following figures from four heats running from 4 to 6½ tons:

Iron Melted.	Coke Used.	Pounds Iron Melted With 1 lb. Coke.
9,800 lbs.	635 lbs.	15 55-127
8,800 lbs.	530 lbs.	16 32-52
10,700 lbs.	610 lbs.	17 25-61
13,100 lbs.	680 lbs.	19 18-26

"'We have never been able to obtain the above results with any other brand of coke,' says the firm which made the test."

* * *

Then my thoughts slowly reverted to the Mr. C. A. Treat who had offered a resolution looking toward uniform honesty among, and the tabooing of lying by foundrymen.

* * *

I don't want to say for a moment that the Treat Manufacturing Co. didn't actually come near to melting twenty to one. Of course, with the coke which they recommend, and the cupola built so as to utilize all the heat in the coke, they ought to be able to do still better, but after all the record they show is good melting, very good indeed, for a western State.

* * *

I was told years ago that Michigan was not a very good State for molders. Some parts of this commonwealth may be all right for a molder. There are other parts he had better steer clear of.

The following advertisement from the Detroit News is rather surprising when molders are scarce all over the country:

Wanted—At once, molder who can tend cupola; $9.00 per week, steady work. Marlette Agricultural Works, Marlette, Mich.

I don't know whether an ad. of this kind should be regarded as a joke or taken for what it actually says. It seems nervy to ask a molder to learn a trade and work for a dollar and a half a day when laborers in many parts of the land are receiving as much.

* * *

Not more than a couple of years ago a wave of solicitude for the molder of the future swept the country. Resolutions looking to his improvement were made. Pictures of the depth to which he had fallen were painted in glowing words. In short, there was a whole lot of windjamming, that cost nobody a cent. There was preaching about the need of a technical education; indeed, if every proposed reform had been carried out, our molders would now be mechanical engineers—everyone of them.

The foundrymen who are so dejected because the molder does not know enough had better go and adopt resolutions looking to their own education. They need to. There is plenty of room for reform in their own ranks.

* * *

I don't know whether the Marlette Agricultural Works secured a molder and melter combined for $1.50 a day, but in any event it would not damage this firm a bit to be educated up to the fact that low paid mechanics are not considered to be a good investment for the firm who employs them or the community in which they reside.

* * *

From the Kenton (O.) Democrat I take this:

"A gentleman will establish an iron foundry in town if proper encouragement is given by the citizens."

* * *

A great many people feel that they want to do something, especially if they can get others to do this something for them. Encouragement by citizens, I suppose, means that these must go down in their jeans for a certain amount of coin to be given to the gentleman who wants to establish a foundry.

* * *

This bonus giving is a poor business all around. If a town has advantages over

others, factories will come to it naturally without spending a dollar in bribing. They will stay there, because all try to choose the best positions. If there are drawbacks to a town, a cash bonus, exemption from taxes and other forms of bribing people to live in a place where they do not want to stay, will not add a bit to the town's prosperity. No reasonable amount of cash can overcome the natural disadvantages of an illy-located manufacturing plant.

Correspondence.

MIXTURES OF ANTI-FRICTION METALS—CORES THAT WILL READILY LEAVE A CASTING.

Editor THE FOUNDRY:

On page 160 of the June FOUNDRY a writer asks for a formula of a white or anti-friction metal for various purposes. I think I can tell him what he needs. Our formula for white metal packing for piston rods and valve stems on our locomotives is as follows: Antimony, 1; tin, 8; lead, 6; or what is the same thing, antimony, 7; tin, 56; lead, 42. We use iron molds for this metal and cast it in solid round blocks 6½ inches long and 4⅝ inches in diameter for piston packing, and 4 inches long and 3 inches in diameter for valve stem packing.

It is bored out and turned to suitable sizes, and it gives us perfect satisfaction. But unless the operator knows how to manipulate these metals the formula will be of no benefit to him. It should be done in the following way: First melt the 7 lbs. of antimony completely, and when it begins to smoke add the tin, a few pounds at a time, stirring thoroughly after each addition of tin; next add the lead in the same manner, a few pounds at a time, stirring as before after each addition of lead, until the whole 105 lbs. is melted. Let this mixture come to a low red heat; then remove the crucible from the furnace, cover the metal with fine charcoal and let it cool until it looks like quicksilver; it is then at the right temperature for pouring and will give satisfaction in use.

In the same number of THE FOUNDRY a writer complains of difficulty in cleaning cores from castings. It may be that his cores are too hard. Our work is locomotive brasses, car brasses and steam metal brass. We mix our core sand as follows: To 6 parts of sharp white sand (Chicago lake sand) we add an equal amount of the fine sand that is brushed from our castings, and to these 12 parts of sand we add one part of flour and sufficient water.

Cores made from this sand require to be well vented and the vents must be open at the outer end of the core. If cores of this composition are well baked, but not allowed to scorch, they will not require any blacking, will leave the casting easily, and it will be smooth; but if the cores are scorched the casting will be rough. From this composition of core sand we make chime whistle cores which hold together without wires.

Lima, O. JOSEPH WHITE.

WHAT THE OBERMAYER CO. WOULD DO.

In our June issue occurs the following. "We are using a great many cores in our work, and while we are having good success in every other way, we have much difficulty in cleaning the core from some of the castings. How can we overcome this difficulty?" To which the Obermayer Co. reply: This party will overcome his troubles by using a good core wash, to viz.—Obermayer's Perfect Core Wash.

HOW TO MELT STEEL OR WROUGHT IRON TURNINGS.

Editor THE FOUNDRY:

Your correspondent who asks how to melt steel or wrought iron turnings will find the best plan is to put them into the crane ladle, in the proportion of from 12 to 20 per cent of the capacity of the ladle and then tapping good hot iron upon them. By this method he will avoid bunging the cupola, and will lose none of his metal by evaporation, as he would be likely to do if he melted wrought iron turnings in the cupola.

Where I learned my trade, steel turnings were always used in this way to cast hammers and blocks for the forge. These blocks as they wore out were melted in a reverberatory furnace and cast into pigs; the pigs being afterwards used with about 30 per cent of Scotch pig to cast cylinders and other castings requiring the best quality of iron. G. L.

Buffalo, N. Y.

FEEDING, OR THE COMPRESSING OF METALS.

Lengthy, "elaborate," and "transcendental" as my article under the above title may have appeared to my American friends and brother tradesmen far and wide, as shown

by the different views enunciated by its critics, I think I was right in anticipating that notwithstanding all that has been written it was far from exhausting in detail the many points relating to this question. This is verified by the fact of Mr. P. R. Ramp entering the arena, before I had got time to discuss the pros and cons of the case with Mr. Moore. All the same, I shall deal with him in as respectful a manner as the circumstances of the case demand. Perhaps I might at the outset say that he might conveniently have supplied the readers of "THE FOUNDRY" with more details than his skeleton sketch is capable of giving, but it may be that the dread he has of ostracism prevents him from safely giving more. However, there is enough to show that the job referred to is cast in the horizontal position, a very important matter in discussing this question.

Although Mr. Ramp is out of harmony with me in feeding dry sand molds of the cylinder order, still it is so far satisfactory for me to know that he agrees with me in the feeding of the heavier class of castings. Therefore, this simply resolves the matter into the question "do cores feed a mold," which I have already dealt with in the article which is the cause of this discussion.

And now to the point with regard to Mr. Ramp's "cold water cure," or modus operandi of feeding, but perhaps I had better confine myself to the context of his article, viz.: his method of feeding dry sand molds, but more especially as it applies to railroad and Corliss cylinders. Assuming that the application of cold water had the desired effect of instantly chilling the pouring and riser basins (which I maintain it has not) the result would be disastrous to the casting, inasmuch as the action of expansion, which is going on inside of the mold, would have to find space somewhere for the increased volume which expansion was creating. This space would be found by the metal finding its way through the lines of least resistance. These being along the edges of flanges, joints or probable cracks about the mold caused by baking or drying. And if one wishes to have this verified there is nothing that I can point him more forcibly to than that which takes place at the casting of the hub or boss of a wire rope or spider pulley. And let us for illustration take one sixteen-foot dia., with approximately thirty-six, two-inch malleable spokes, the ends of which may be roughly placed at six inches in the boss, we have here a positive limit of expension, the expansion being determined by the limit of temperature of the metal which envelops those spoke ends, the one must assimilate with the other. Immediately those bosses are cast and when all outside metal is thoroughly fluid there is a visible expansion takes place and not infrequently to the extent of the metal rising right over the sides of the basins, and if this is not intelligently manipulated without the abrupt closing of the gates, just as sure as it is a casting, the paps containing those spokes are rugged and fringed and usually peel off as clean as the outer skin of an onion. This being entirely caused by disallowing the expanding metal a way of escape.

But further and without going into details of the cylinders in question, supposing such cylinders had an attachment containing twice or three times the average metal, it must be obvious that the entire surroundings of the attachments referred to have become solidified while they have only attained the plastic stage. What effect a core can have in densifying those parts I leave to the minds of practical men to judge for themselves.

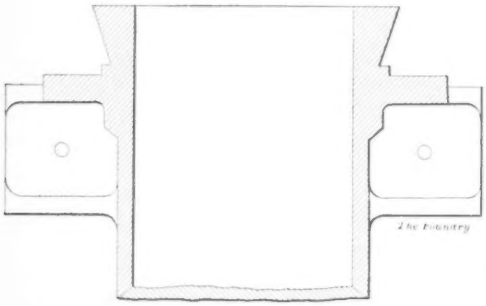
Again let us look at Mr. Ramp's theory regarding the limit of expansion of cores. After years of careful practice and keen observation, I cannot regard this theory in any other light than that of a myth, and it is most undoubted of an unknown quantity. Look at the contents of cores in general, and what do we find. A form composed 25 per cent or thereby, of which, to view it practically, is as destructible by heat as snow is to a summer sun, and but for the large per centage left everything remaining would collapse, and this fragile article is what according to Mr. Ramp's theory, and others who think with him, what they look to for the success of producing a sound and good casting.

No, sir; this theory can't hold water. But do not suppose that I don't admit to partial expansion of cores when enshrouded with fluid metal. All the same, cores never will, in my opinion, expand to feed a casting, and the momentary expansion which takes place is of no value whatever. With this momentary or theoretical expansion of

cores destruction begins, because the heat requisite to create expansion must destroy the vegetable constituents of the cores. Therefore it must be clear to Mr. Ramp and others interested that there cannot be expansion and partial destruction at one and the same time.

It is imperative, and all practical men know it, that core sand and especially that which is used for cylinder cores, must be of a destructible nature. Were this not so the fettling of many of our most intricate castings would be an impossibility.

Having given his article a very unbiassed consideration throughout, I hope he will pardon me when I say that I consider his method of feeding cylinders nothing short of antiquated quackery, and can be of no more value for the purpose intended than the proverbial "drop in the bucket." It can neither do good nor harm.



Take the same job and cast in the vertical position, and apply this cold water cure and with the usual sinking head added you will have an object lesson at the machining of the top end of the casting that you are not likely to forget. I would just like to add in closing, that it is a matter of little importance whether cylinders as referred to are fed or not, when cast in the horizontal position. But alter, changing the position of casting same to the vertical, then feeding becomes an absolute necessity, if a sound casting be imperative. The figure attached I give as an ideal sinking head for vertical casting, and is an exact reproduction from my pen which appeared in "Engineering," London, England, Dec. 25, 1896, under the title of "Defects in Cast Iron Castings," by a foreman molder. I need not enlarge on this subject as the figure will clearly show by its additional metal which may be twice greater than the average metal, and must keep fluid longer than any other part of the casting, thus supplying or feeding the natural cravings of the casting during the process of solidification, and it will be all the better and the more surely compressed by the intelligent use of the feeding rod.

W. ROXBURGH.

Kilmarnock, Scotland.

PLUMBAGO CLUB.

175 Per Cent. Advance in Price of Crude Plumbago.

An Interesting Subject Badly Handled—A Hot Meeting.

BY SAM DUE.

There was no question in the minds of the fifty odd members of the Plumbago Club who met at the Hotel Walton in Philadelphia last month that the cause of the most trouble was originated by several members who tried desperately to ring a black man into the club's membership.

The black man was a gentleman from Ceylon, East India, who told several members before the meeting that he had come to this country at his own expense; that he was a large owner in Plumbago mines in India, and that he had heard of this club before he left there, and added that it was the height of his ambition to be a member of the Plumbago Club.

The greatest noise emanated from several members from the South; one was a tack manufacturer from Birmingham, Alabama, whose output is taken by the largest concern of its kind in the world and is used by them in the manufacture of the bellows they sell.

He howled so loud in the cafe that one of the $200.00 a week blue uniformed gentlemen about the hotel informed him that he might get real sick and be compelled to call a doctor, which he explained would ruin the reputation of the hotel as a health resort. Several others were loud-mouthed in their opposition, and the cafe increased their receipts wonderfully through the arguments over the color line being drawn in the club. The agitation grew louder as newly-arrived members joined the crowd, and long before the hour called for the meeting, the sound that went up as high as the roof garden all came from the cafe and put one in mind of a historical political convention where a majority of the delegates were locked out of the meeting place.

After a long delay the sergeant-at-arms announced a full house; this was apparently unnecessary. It got so warm that some one turned on an electric fan. It made an awful racket, but it was found positively necessary on account of the heat. The club soon adjourned to meet at some cooler place.

In five minutes all the members were in the cafe again, and the arguments and agitation about the gentleman from India continued. No one seemed to mind the noise made by the electric fans in the cafe.

Notices were soon posted to the effect that a meeting of the club would be held in Independence Hall at 4 o'clock. At the time specified a goodly attendance was disappointed to find no chairs in the old Hall of Congress, and it was decided to adjourn to Atlantic City, where the visiting members seemed anxious to reach. At 10 o'clock next morning a full attendance was recorded at the Assembly Hall on the steel pier. The predominant controversy continued up until the Plum Plum Ji tapped in.

After the reading of the minutes of the last meeting, Mr. Edward J. Hastings, the President of the Importers' Association, was called upon for some information about the visible stock of crude plumbago. He stumbled through nineteen yards of typewritten statistics, going back to the discovery of plumbago, and the first shipment to this country, informing his hearers of the number of casks on hand each year, down to 1899, and astonished the assembly by informing them that the last three hundred casks in the United States had been purchased the day before by John A. Meigham, of Pittsburg. This was the cause of an uproarious interruption, and Mr. Meigham was besieged on all sides. A disturbance at the door just at this time was caused by a messenger boy's appearance guarded by eight policemen, who made their way to the Plum Plum Ji's desk and handed him a message for Mr. Meigham; as all interest was so centered on him, the contents of the message made every member gasp through abject curiosity. In two minutes every member knew its contents, and the knowledge it contained sent a pallor over the face of every one.

Here is a copy of the message:

"John A. Meigham,
Plumbago Club,
Atlantic City, N. J.

Your three hundred casks plumbago Ex. steamer Angola sunk in East River on lighter this morning. Advise.

Dennis Straight & Co."

This caused such excitement that the meeting immediately adjourned. The loss of every visible cask of plumbago in the country was in everyone's mouth.

At 3 o'clock in the afternoon, a very small number of members got together. The Plum Plum Ji had been advised that a general meeting of the club could not be held in Atlantic City, as all but those there present had gone to New York, so the small party immediately adjourned to that city. It was not very hard work locating the majority of them, and a meeting was held in the Imperial Hotel in the evening. The East India gentleman had been invited to tell the club what he knew about the stock in his country and the prospects of quick arrivals, but the committee composed of Tom Griffith and Harry Frohman and the black complexioned gentleman were nowhere to be found.

The club took up a big bundle of complaints from foundrymen over the country.

The first letter read by the Nizam was as follows:

"To the Honorable Members of the Honorary Plumbago Club.

At this point without proceeding further Mr. McCormick, of Pittsburg, moved that the vile epistle be filed or burned; but after some little discussion it was referred to the Committee on Discipline and Morals."

The next communication was as follows:

"Office of the Bungtown Header Co.,
Cottonwood, Texas, July 8th, 1889.

During the past four months we have bought plumbago from every concern refining same in this country, and are sorry to state that we have plenty on hand and cannot use any of it.

This plumbago has cost us all the way from 5 cents to 12 1-2 cents per pound. The trouble with it cannot be explained, so we thought it best to send a sample of each by express. Will your experts please invevstigate and advise us. Very truly yours,

The Bungtown Header Co.,
U. C. Work, President."

The Nizam stated that he had paid $8.16 expressage on same, and wanted to know from which fund he was to draw the money. An avalanche of motions drowned his voice. The Plum Plum Ji recognized Mr. Evans, of Saginaw, Mich., who moved that a new Committee called the "Grievance Committee" be appointed.

Messrs. Evans, Kingsland, Pettinos, Thompson and Bougher were appointed and ordered to report at next meeting.

The next communication was a puzzler.

"Ypsilanti, Mich., July 3rd, 1899.

Gentlemen:—Please wire me on receipt of this, what salary you will pay a man who knows all about plumbago, is a total abstainer, and will be at leisure after August 1st, 1899.

Dr. A. J. Felix."

A member in a back seat moved to file, for, as he stated, what do we want with a man who knows all about plumbago and don't drink? Just then the Nizam found another letter from the same writer, who said he had made a mistake; he had mistook the name for Lumbago Club.

The appointing of the Grievance Committee relieved the club of considerable work, as nearly every communication read was a kick about the quality of plumbago they had received from members of the club, and asked for investigation and recourse.

A telegram from John Hill to take a drink on him almost stampeded the meeting, but by violent use of the Bench Rammer the Plum Plum Ji got the meeting in order long enough to report that the committee in charge of Hon. Geogi C. Gudec, the colored gentleman from India, had arrived. The old spirit in a large number of the members commenced working again, and amid another uproar Mr. Chamberlain's motion to adjourn at call of President was carried.

Just before the adjournment a hot protest was sent to the Nizam from the members who were present who have very little interest in plumbago. The chairman of these members threatened the club to withdraw in a body. Mr. Pollock, of Rogers, Brown & Co.; Jim Green, of Mathew Addy & Co., and Andy Hawthorn, of S. R. Baird & Co., were very loud in their protestations, claiming a majority of members of the Plumbago Club have no interest whatsoever in plumbago itself. The communication will be read at the next meeting, at which time it is to be hoped matters will be taken up which will put these jovial people in good humor. It is proposed to initiate a large number also.

The enormity of the loss of the last 300 casks of plumbago in the country was almost enough for one meeting.

Venting.

BY P. R. RAMP.

The required venting of molds, like the many other procedures in the molding trade, is varied.

More depends on the grade of sand, the size and shape of the casting, than is generally conceded.

I have observed in my experience that an open sand needs very little venting. A finer grade, a great deal.

In venting a mold care should be taken to provide a free passage for the vent.

The habit of venting the drag part of a mold and rubbing the bottom board down solid, closing all the vents, is the cause of many cuts and scabs on a casting.

This could be avoided by running a wire between the drag and the bottom board, thereby making connections with vents made previous to rubbing the board down.

In making very heavy castings where the metal covers considerable space, for instance, a straightening block, say 8 feet by 3 feet by 8 inches. Should this be made in a flask, which is always preferable when possible, one inch holes should be bored along each side of the drag part of the flask, just below the pattern or mold. After the mold has been rammed up a fair-sized wire or rod must be used to vent in each hole; thus creating an instantaneous exit for the vent or gas, avoiding the ugly buckles or scabs usually found on the bottom of castings of this description, especially in localities that are not highly favored with good molding sand.

For an illustration see Fig. 1. Letter A represents the drag part of the flask; B the 1-inch holes in the side for vents.

Fig. 2 gives us an end view of the same flask and mold. Letter A is the interior of the mold; B the vent rod as it is used.

The cope part of this mold being subject to intense heat while casting, if not well vented will be in danger of being drawn down in patches before the liquid metal

reaches the height where it would act as a support to the same.

Failures to produce good work along this line are recognized by molders as "burn downs."

Fig. 3 represents a locomotive piston head pattern, placed in an iron flask, preparatory to ramming.

The greatest trouble experienced by the molders in making these heads were scabbing at the point indicated by the letter A in Fig. 3, which are pockets formed by the six bosses marked D. Having considerable trouble trying to get these castings out at a reasonable price, we took them from the molder, made iron flasks, with holes in the sides of the drags. See letter E in Fig. 4 for the purpose of laying a rod in each

Fig. 1

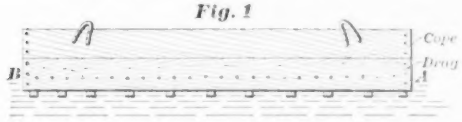


Fig. 2

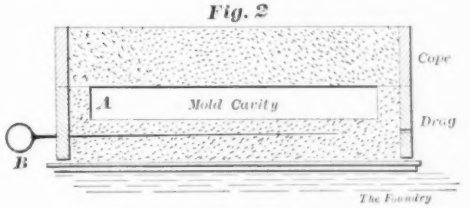
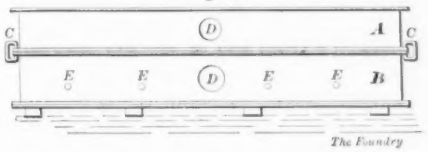


Fig. 4



pocket, one end protruding through the side of flask at C in Fig. 3. After the mold was rammed these rods were withdrawn, which produced sufficient vent. This plan for venting them enables us to produce them at a very reasonable cost on a molding machine.

Fig. 4 represents a flask containing a mold of this kind, ready to cast. A is the cope, B the drags, C the clamps, D the trunions for handling it, E the holes in drag for venting purposes.

In making jobs in the floor the cinder-bed should be as close to the mold as possible. To have the cinder-bed too far away from the bottom of the mold increases the liabilities to a cut, or buckle, owing to the fact that the gases have so much further to travel before they are released. The temper of the sand must always be taken into consideration.

It is practical to work the sand as dry as possible, as it has a tendency to lessen the required venting. Bad castings are not all made by the molder who does not believe in much venting, but very often all that is lacking to turn out a good job is the vent wire. There is considerable time consumed in unnecessary venting, especially among the apprentices. Not being informed properly on the subject they vent many jobs that do not need it. The foreman should give the young apprentices his close attention, and not allow them to grow up in the business wrong. There are many little

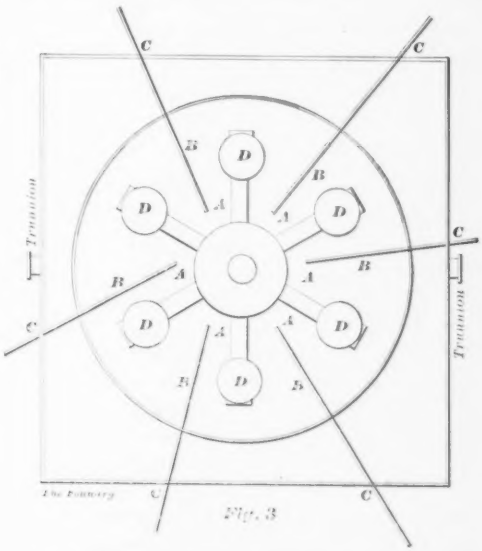


Fig. 3

details in the molding trade that an experienced man could teach the younger if he would, which I am sure would be a benefit to all concerned. The many little unnecessary moves made by an unexperienced man, or by many with a life-time experience, greatly add to the expenses of carrying on a business of this kind.

Hence, it is advisable for the molder to study economy in molding, to go over the same portion of his mold as few times as possible to learn just how much work is necessary to complete a job and do no more. By so doing he will in time be able to produce good work, at a reasonable cost to his employer, without so great an effort on his part as it sometimes appears to be at pres-

ent. So it is in regard to venting, it is but a small item in the trade, but many minutes and hard labor, can be saved by knowing just what is required.

I do not advise a molder to lean towards that (Good Enough Habit), so well described in the May issue of THE FOUNDRY, but I have noticed men hard at work with vent wire in hand, pricking away for dear life on a mold for some little casting which would be just as good if it never had a vent in it. They are consuming time without increasing their product.

The writer does not mention these things without realizing the fact that the readers of THE FOUNDRY are more or less posted with reference to the same. But merely to refresh the minds of the molder on so important a subject.

By careful venting many a cut or scab can be avoided.

Dividing the Authority.

By W. H. KANE.

Not only in THE FOUNDRY, but in other magazines of late has the subject of "Dividing the Authority" in the foundry been discussed, from the chemist's side of it only. That very few foundry foremen have the time at present to devote to any such discussion, is one reason that chemists have full swing of some of the most valuable pages in various magazines. The foundry foremen are generally self-made men, who learned the trade of molding and mixing by careful study and practice, who very seldom, if ever, have friends to show them how to figure a heat. Most foremen have but a common school education, and most always are on the lookout for all chances of improvement that will advance their interests, as well as the interests of the firms that employ them. It is no uncommon occurrence to find a foundry foreman devoting twelve to fourteen hours a day to his duties, in order to keep up with orders and figuring how to slip in a few extra heats on the molders, to make up for some that were lost after pay-day. Very few chemists know how to arrange or grade a heat for malleable iron. I believe that the most successful iron mixers are practical molders. During my experience with chemists for the past ten years there are very few who get the exact analysis of the same metal, while I know of only one practical chemist and founder who proves his theory beyond the doubt of the most scrupulous foundryman. Most chemists are young men just out of some furnace laboratory or college, where they were under the charge of some expert chemist or professor, and were employed only to check up different parts of a cast. Take a chemist's "say" for it in your April issue; he says: "A chemist to be successful must possess more than a theoretical knowledge; he must be practical, and should realize that the most carefully calculated mixtures sometimes make the poorest metal, owing to the unreliability of proceeding on average samples of pig iron used. His work in the laboratory may be always good, but, lacking in many cases the foundry training, he follows the wrong clue when his originals turn out poorly." This appears to me a very poor excuse, as there is only one way to figure iron if your analyses are right; and if you know the working of your furnace, you have nothing to fear. Take any of the foundry foremen who are in charge of the malleable foundries, you will find them all conversant with, and know just as much about the effects of, any of the metalloids, upon iron, as any of the so-called scientific chemists, who would like to share the authority with the foundry foremen; but to sum up the whole thing, all that is required is a chemist to check up with the furnace from which the iron is purchased. A chemist can be obtained for this purpose for from $40 to $60 per month.

The analysis should be turned over to the foundry foreman to make the mixtures, for as he knows where all patterns of various shapes and sizes are at work, he is the most competent to judge from where they should be poured, whether it is from a mixture of silicon 1.25% and manganese .80, or from a mixture of silicon .75%, manganese .40. Chemistry and chemists are all right in their places, and every foundry foreman should raise his voice in praise for such chemists as Dr. Moldenke and Prof. Stanford, Geo. C. Davis and S. S. Knight, who have advanced the practical application of chemistry in foundry practice. While on this subject, I want to say a word in regard to the habit a great many foundrymen have, men, too, who employ chemists and ought to know better, namely, of analysing only one pig from a car. It is a well-known fact that iron will

vary considerably in its contents, especially as to silicon, from the beginning to the end of a cast. Now very much depends upon the selection of pig iron from the car, to get an average sample, as to whether the analysis accompanying a carload is correct or not. Suppose, for instance, that samples for use in the laboratory are taken from six different pigs in a car, then drilled and mixed in equal proportion; that will surely give an average analysis. Speaking from personal experience, I can say emphatically that according to this rule I have found very little difference, not enough to warrant a firm in keeping a chemist for checking up the pig iron. The idea that a chemist to be of any value, or best placed, should divide the responsibility with the foreman is a false one. The best chemist that ever lived would be almost useless in a malleable foundry, to assume the responsibility for results of mixtures, did he not know the peculiarities of melting and molding in producing good sound castings? To learn these peculiarities, he must go with the foundry foreman to investigate, and observe the many ways in which the melter and molder can give different qualities to like grades pig iron, etc. The chemist's part in aiding the foreman can be made as independent of the responsibility in securing good malleable castings, as that of the patternmaker, coremaker or flaskmaker, in assisting the foreman to complete his appliances for making molds. It would be just as reasonable to claim that the responsibility for making good malleable castings should be divided with the patternmaker or coremaker, as to split up with a chemist, and no level-headed chemist will seek any such responsibility.

Now let us take up the first chemical composition of iron, and hear what three of the most practical men have to say about it (carbon):

No. 1. Mr. Thos. D. West, author and practical founder, says: "Carbon should be wholly ignored as far as general foundry practice goes." I agree with him to some extent, as it is almost impossible to figure in a mixture for malleable castings owing to the transforming of the graphite carbon to the combined carbon in the reverberatory furnace, as most all, if not all, must be combined before pouring, and as the annealing transforms the combined back to the graphitic in these operations, there is a percentage of the total carbon lost. Next we have Mr. A. Sorge, mechanical engineer and consulting chemist. He says that carbon is the most valuable constituent of iron, and high carbon should be used for malleable castings." Now I find from actual experience that the lower the carbons are the better the malleable castings. Below is a record of four heats; I will quote four samples out of tests of 20 heats, and all bear me out on low carbon.

This shows that chemistry is not the cure-all. The heats contained 50% sprues, 60% of the pig iron was coke, and 40% of the pig iron charcoal.

						Per cent		
			Ttl. Carbon,	Ttl. Carbon.		lost in	Tensile	Elonga-
Silican.	Phos.	Sil.	Man. Hard Iron.	Soft Iron.		Annealing.	Strength.	tion.
A .91	.200	.033	.27	1.97	1.06	46.19	A 54900	9.50
B .55	.173	.041	.24	2.25	1.67	25.78	B 49500	10.16
C .84	.167	.057	.22	2.85	1.89	30.18	C 36000	2.50
D .75	.172	.058	.34	2.91	1.83	37.12	D 35700	3.00

I will next take Mr. Guy R. Johnson, late of the Embreville furnace. Here are a few remarks from an article which was read before the Western Foundrymen's Association at Chicago, February meeting, 1898: Mr. Johnson says: "In justice to both furnace and foundrymen, pig iron should be bought and sold by analysis, meaning by analysis to include the carbons as well as the usual silicon, sulphur, phosphorus, and occasionally manganese. (The last metalloid, as every one knows that ever purchased Embreville iron, never got any manganese analysis.) As a matter of fact, the carbon would have to be included in the analysis of pig iron if the iron were bought solely by chemical analysis, and still we should not have enough data to enable us to judge accurately of the characteristics of the iron. I am not saying this to discourage those who wish to see the foundrymen's business put on a more rational and scientific basis. On the contrary, I believe in such efforts, and have done what I could to help them along." Mr. Johnson also states in his paper: "I have

found, however, that analysis will not do entirely; there is unquestionably so much influence exerted by the physical work of the furnace on the result of pig iron, that it is necessary not only to have analysis, but also to have the grade added." I consider Mr. Johnson's article one of the most reliable that the average foundryman has ever had a chance to read, and is worthy of the consideration of our scientific men, and I think that a good deal more can be said on the physical practice. While heats for malleable castings can be figured with the same per cent of silicon, sulphur and manganese, they still can have a very different grade. You can have an average grade of mixture at a No. 4 iron with silicon at 1%. You can also have an average grade at 3¼ iron and your metalloids still be the same. Therefore, I heartily endorse Mr. Johnson's article, and confidently assert that no foundryman should ever put a heat in a furnace without first getting the grade he wants, and the metalloids next. He should know the working of his furnace, for in some furnaces the iron and carbon will combine before the iron is hot enough to pour; then again, with other furnaces the iron will stay hot too long before combination. Very much depends on the blast, and also on the way it is fired and puddled. There is a loss of silicon and manganese as well as carbon in the melting of malleable iron in the reverberatory furnace, and I find the softer the blast the more readily will the iron anneal. In conclusion, I want to pay another tribute to chemistry, and that is, all mixtures should be made from analysis whether analysis is furnished by the chemist employed at the foundry or at the blast furnace.

Chaplets.

By W. R.

I think it would be useless to preface this short article with an explanation of what chaplets are used for in foundry practice, or even dilate on what their various types should be. Suffice it to say that every foundry makes or supplies themselves with those best suited for their own particular work.

Chaplets are a necessary evil that molders will likely have to contend with so long as castings are made. One can scarcely think of them being a casting without doing more or less harm although in hundreds of cases the evil never shows itself; still if one were to break up any piece of a casting where chaplets are embedded the weaknesses of those parts would be very apparent. All the same, chaplets can be used and do no harm, when intelligently applied, to a casting either under steam or water pressure. The indescriminate use of chaplets has been the means of losing many a good casting, and the safest rule for molders to go by is to add a little more thickness wherever it is necessary to employ a chaplet. If this be carried out it will certainly give the greatest satisfaction to all parties since it is an admitted fact that chaplets cannot be interspersed among the cores to keep them in their places without deteriorating the metal as afore mentioned.

It is scarcely permissible to place a chaplet on any part which may have to be polished but wherever it is necessary to have one or more the only way to get over the difficulty is by bedding the studs ½-inch or so below the surface of the mold. These projecting from the face of the casting can be easily chipped off by the dresser or fettler at the time of cleaning the casting and when machining takes place the worst that can be noticed is a white spot on the finished surface these being caused by the malleable stud being more dense than the cast iron which enshrouds it.

It is both ridiculous and amusing the antidotes which some foundries apply to overcome the evil tendency which chaplets have to create blow holes and I think the tarring process may be said to carry the palm in this respect. I have worked in shops where it was the only antidote applied. Now, if I were asked what would be the best thing to do to admit of a mandrill being easily taken from a casting I would unhesitatingly say tar it. Thus we see that the one has no affinity for the other and the chance of getting a casting steam or water tight with a tarred chaplet can only be by casting at a temperature not likely to be good for the general conditions of the mold. It will be obvious that this high temperature of casting enables the metal to fight and destroy the coating of tar the chaplet has received before setting down. The amount of evil at all times being proportionate to the coat of tar the chaplet may carry.

The application of chalk is another way of it which is not advisable either, but some

regard its good qualities from the fact of its absorbing power in taking up the watery beads which form themselves through distillation or condensation in every green sand mold that may be hermetically sealed for any length of time before casting. We see from this fact that the chalk and water have resolved themselves into what may be very appropriately termed whitewash. Of course this is showing it in its worst form but it is only by treating matters of detail in this light that the success of a molder's life may be somewhat assured.

Again many pass chaplets through the fire which is not without good effect at least in so far as the destroying of oxide of iron or rust is concerned. But the dust which adheres to the burnt chaplets in this mode of treatment is at all times objectionable and should never be used without coating it with oil. The oil attracts the metal to the chaplets which in turn creates combustion and the otherwise burnt oxide of iron passes into the combination with the metal giving the best results possible. Indeed chaplets that are comparatively clean are quite safe with oil alone.

The tinning of chaplets is commendable, and where this is properly done it certainly has its advantages over some of the cruder treatments. As this adds considerably to the cost it frequently happens that a deliterious compound of spelter and tin is substituted which has a detrimental effect and cannot give the result desired. Although tin has the greatest affinity for cast iron, and in that way I believe has the greatest acceptance among molders, still this has not been found the panacea for all ills that accompany the use of chaplets. Wherever these are in use molders would do well, first of all to see that they have been dipped in pure tin and not galvanized as frequently happens, also to make sure that the dipping has been perfect and complete as chaplets that remain a long time in store, if imperfectly tinned, take on rust on those parts.

With regard to the use of red lead such is acceptable in many cases like marine bottoms or machine tool castings which are not subjected to any hydraulic test I will explain this in a word. Dry lead or putty may be regarded as an indestructible element, but with oil added there is fusion, therefore it is better to use the oil by itself. By doing so a better fluxing power is obtained on the chaplet on account of discarding this putty or as it is known to molders by the term of red lead.

And now for the last of those antidotes, which I consider the most commendable of all, viz.: creosote. I do not care however bad a chaplet may be with rust this material is at all times capable of destroying it. If any one may doubt this assertion he may prove it for himself. Take a piece of rod iron, however, rusty, dip it thoroughly in creosite and then put it into a ladle of molten metal and that which otherwise would have created an explosion receives the creosoted red iron with comparative placidity. As this mode of treatment costs so little in time or money, chaplets, although tinned, are safer when given a coating of creosote.

The Pressure of Liquid Iron and Other Sources of Pressure.

By R. D. MOORE.

Doubtless a correct knowledge of the pressure of liquid metals upon a mold, in process of casting, in all its various positions, is a matter of the greatest importance to success in iron founding. Ramming, weighting, clamping, anchoring, pitting and otherwise sustaining molds while being cast, all require to be regulated by the pressure to be resisted, yet few of the "rank and file" of this useful handicraft have either the figures or the regulating principle involved, for every day use; an occasional disaster being the chief factor in preserving a fairly safe practice.

Seeing many disasters resulting from ignorance of the law regulating such pressure, led the writer, as early as 1848, to look for and find a rule by which to calculate, with sufficient accuracy for molder's purposes, what the pressure would be in any case, or under any circumstance.

I presumed that, according to the hydrostatic law, if a bar of iron one inch square and a little less than four inches long weighs a pound, that a column of liquid iron a little less than four inches high would give a pressure of one pound to the inch at the bottom.

The standard books were teaching, at that day, the general law that heat expanded and cold contracted the metals, etc., uniformly, and I was thereby led to suppose that the above rule was overstating the actual pres-

sure a fraction, and therefore safe for the molder to work by, but later discoveries have shown that the pressure of liquid iron is greater by a considerable fraction than the above rule would give. I have, all these past years, used this rule, "a four-inch column giving a pound pressure to the inch," on account of its simplicity; although not strictly correct it is safe when we consider that we must always allow a large margin of safety to provide for uncertainties, of which there are many.

Mr. Robert Mallet, while editor of the Practical Mechanics' Magazine, of London, in about 1865, tried some experiments to ascertain the actual pressure of iron on a mold. He experimented with a shaft, cast upright in a dried mold, by placing recording gauges at every two feet of the mold down to 14 feet. At 24 inches down the record of pressure was 6 4-10 lbs. of pressure to the inch.

Mr. Mallet's report enables us to reach very close to the reduction of volume which takes place when iron is melted by the increase of pressure.

A cubic inch of cold iron weighs 26-100 of a pound, or one per cent. more than the above rule of a four-inch column to a pound of pressure.

An inch square bar, set on end, 24 inches high, would weigh, or press at the bottom, 6 lbs. and 24-100.

Converting the 4-10 of fluid pressure into hundredths, for comparison, we have a pressure, at 24 inches, of 6 lbs. and 40-100, an increase of 16-100 over the weight of the cold bar, a little more than a sixth of a pound.

It is found that iron, and nearly all the metals, together with tallow, beeswax, rosin, water, and in fact nearly all substances capable of being melted and congealed, by a change of temperature, are subject to the following law of expansion and contraction. In the process of melting iron, for example, expansion takes place, in proportion to the heat, up to the melting point, when it suddenly contracts more than it had expanded up to that point, and explains why cold metals, and other substances, float so buoyantly upon melted substances of the same quality.

According to the expansion and contraction theories taught by Arnot and others, in former days, the cold metal should sink to the bottom of the melted metals.

With so many facts presented in the manipulation of metals, etc., it appears strange that no one, up to a late date, had discovered or attempted to expose these errors of the writers on physics.

The credit of the first exposure is probably due to Mr. Nasmyth, of Manchester, Eng., a distinguished scientist and inventor, who published a paper on that subject about 1858. Mr. Nasmyth was the inventor of the modern, indispensable, steam hammer, introduced into this country about 1845.

The writer has noticed many facts leading to the conclusion that iron underwent an expansion in the latter part of the fluid condition, but could get no definite light on the subject for many years.

An interesting case was witnessed in 1850, and probably can be explainable only on this theory.

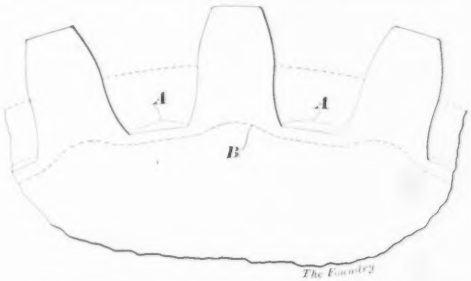
A frame, or "former," for shaping boiler sheets was cast in "open sand," being about 2 feet wide by 6 feet long, the bar section all 4 inches wide by 4 inches deep, except on one side an inch was added to the width, running about 2 feet in length. A few minutes after the crust was formed the top skin on the 2 feet of heavy section was sure to slowly rise on one side, and several pounds of fluid iron run out on the bank of mold. The molders present all pronounced it a very extraordinary occurrence, but I regarded it in accord with facts previously witnessed. The enlarged section had a thinner and weaker crust than other parts of the frame, and gave way easily, but if the frame had been all of uniform thickness it would have all stretched a trifle, and not broken the skin. It is proper to take into consideration the shrinking of the skin in advance of the central portion of the metal, as a factor in this behavior, but that will not account for all we witness.

Some years ago it occurred to the writer to try an experiment on roll pinions. They are cast with a neck top and bottom to form a journal and coupling and used to connect, and drive rolls. The large size cast in dried molds, exhibit strong proof of this unrecognized expansion. As every observing molder, who has handled them, knows, they swell in the bottom of the tooth space, if they have been fully fed, and if no swells appear we may reasonably suspect a dangerously

short feed, a shrink hole under the top neck.

We had thoroughly tested the power of hard ramming to stop these swells, but found this entirely inefficient. Knowing that the statical pressure of the metal was only a small part of that required to crush such a mold, there was no escaping the conclusion that some other power was at work, and that that power was expansion and must take place in the latter part of the metals fluidity. It is fortunate that when these swells takes place the tooth proper has set hard, otherwise they would be ruined, but the tooth space surface being soft enough to yield receives all the swells—see illustration AA, frequently ¼ inch or more in thickness, when they begin to be "in the way."

Rolls exhibit the same kind of swells, and in the same situations, namely, on the inner end of necks and bottom of grooves, where the skin remains soft longest. These after



swells will probably be found to occur in all iron castings, but it is only where there is heavy metal, and great inequality of cooling off the skin, that the swells are noticeable.

The idea suggested itself to the writer that if the swells, in roll pinions, were caused by "after expansion" the amount of swell could be regulated by the length of time the feed should be continued, or, the amount of iron fed in. Three 20 inch roll pinions ordered at the time gave the opportunity for a decided experiment. The first pinion cast was fed thirty minutes, and the swell found to be 3-16 inch in thickness. The second, fed twenty-five minutes, showed ⅛ inch scant. The third, fed twenty-three minutes, showed a swell of about 1-16 inch, and was adopted as the proper time. To reduce it below that size would be running into danger of a shrink hole under the bottom of the top neck.

The time of feeding 22 inch pinions was fixed at twenty-eight minutes, and 24 inch at thirty-six minutes, which gave in those sizes about the same swell, uniformly.

The probability is that a shrink hole is first formed, and that the after expansion swells to the extent of filling the cavity again, the swell continuing until the iron, in a mush state, is squeezed into a very solid mass, and also producing the swells under consideration.

With this view of the subject it is not unreasonable that the amount of swell can be regulated by the time the feeding is continued.

This practice was continued through many years with uniform and satisfactory results.

The dotted line B present an imaginary boundary line of solidity when the latter expansion takes place.

The Cleaning of Brass Castings and the Saving of Spillings.

By F. W.

In answer to inquiries in THE FOUNDRY as to how to clean brass castings, I will give our process which may be interesting, if not entirely new, although it is original with us; and at the same time give our plan of saving the spillings of the floor and putting them in a condition to be re-melted, as it is a part of the process of cleaning the castings.

The spillings, furnace droppings, and other refuse from the foundry floor is taken to a rumbler and rumbled with the aid of two pieces of pig iron, as fine as possible, the dirt sieved through a No. 16 riddle, and that which is saved in the riddle washed by hand in a tank to get the light dirt out (woody substances, etc.), after which it is put in with the castings in a water drum and the action of these small pieces of metal, for it is only the smaller pieces that must be saved in this way, against the castings in water, so thoroughly cleanses them that not one speck of dirt, either core sand or molding sand remains, they are so smooth and bright they need no further care.

We put the largest castings the drum will take, with the smallest and thinnest ones, the smaller castings also acting as cleaning agents to the larger ones. The success of the work in keeping light and thin castings from being bent or mashed is in the packing; the drum is packed perfectly tight, systematically, as you would pack a trunk; the larger castings first, then the smaller ones

thrown in, and on top of all, so that the small pieces may fall between, the washings, as we call them. These washings are afterward, as bright and clean as the castings, and are put in pans and into the core oven at night to dry, when in the morning they are put through the magnet machine to remove iron, when they are ready for re-melting.

A description of our water drum may be interesting, for we consider it was made very cheaply and now runs very economically. Formerly it was a simple barrel drum for rumbling castings dry, but a great many castings were never rumbled for the reason that they came out dirtier after, than before rumbling, so that it was very little used.

We had a rectangular sheet iron tank made, large enough to set the drum into, leaving a space of about six inches all around, filled the tank with water, which would leave the drum standing about three quarters in the tank, having placed the gears above, in order to bring the belt pulley out of the water. Our drum is run continuously and we never change the water, only add new as evaporation and waste lowers it. The tank is cleaned of dirt and sand often enough to keep it from interfering with the working of the drum, when it is then necessary to take off about one-half of the slabs.

As you will understand, the drum is not water tight, but sufficiently so to not lose the finest washings. The drum is now wooden lined having been made so when we changed to a water drum, as the old rumbler had one-half inch holes in, and the slabs were about one-eighth inch apart; the wooden lining is the heaviest expense as it does not last over six or eight weeks, and we are considering the advisability of leaving the lining out altogether and placing the slabs close together, closing up the holes and making up the spaces in one smaller slab.

Venting.

By W. R.

The art of venting should demand asidious study of all molders who have a desire to master the intricacies of their trade. In most trades form contour and substantiality of construction would meet all wants generally speaking. Not so is it with the art of molding. While those points may be all that could be desired and should venting be imperfecty attended to, blowing, scabbing or both together is likely to ensue and that which should have been a good casting as likely as not turns out as scrap; hence the importance of venting properly and giving easy access of exit to the gases.

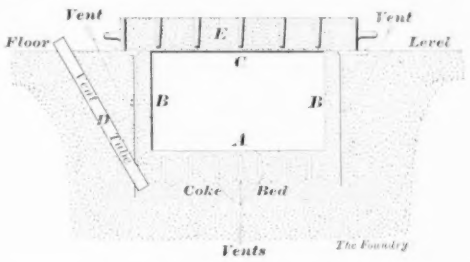
I might make a slight digression on this subject just to say a word or two in passing to show how far the finishing of a mold has to do with venting and what is said at present specialy applies to heavy green sand work. But should the principle be carried into all the branches of molding, it will serve a good purpose.

The fault common with jobbing molders in finishing is the desire to polish the surface until the grain of the sand which composes the mold becomes almost imperceptible. Wherever such superfluous work is performed the danger of scabbing is greatly increased, even although the vent wire may have been applied with intelligence. The reason of this to practical men must be obvious; such glossy polishing destroys to a great extent the pourousness of surface, in consequence of which there is but little affinity with metal and mold, and as soon as such a surface has to do with molten metal there is no rest for the metal until the polished face breaks away, thus causing a scab on the casting. Therefore it will be observed that form and efficiency should be the guiding principles in finishing a mold and leave as much polishing as is necessary to come after blackening or black washing.

Now as to the general application of the vent rod, it may be asked, is there no guiding rule whereby one may safely manipulate the rod with some degree of accuracy? I say there is, but to dilate on even one day's work passing through the foundry as an example would be quite capable of forming a good volume in itself.

The figure I here produce will serve to show what is required in general practice. In looking at the relative position of the vents, viz., the bottom A, the top C, and the sides B, I believe I am within the mark when I say that the danger of scabbing on the bottom is three times greater than it is likely to be on the sides and the danger from scabbing on the top side is almost nil.

In the foregoing I have merely shown effect; but what of the cause? The only reason I can assign for it is the natural tendency which gas has of flying upwards and were it not for the vents that are seen on bottom of figure, nothing could save such a mold from producing a badly scabbed casting. Having made the principle of venting the bottom, I presume, clear, it leaves me but little to say concerning the side vents. It will be noticed that these make their exit through the joint of the mold, but should such fail to make their way of escape as mentioned, there is no reason to doubt that were the side vents connected to the coke bed, as shown in figure, the safety from scabbing in such a job is equally good. There is no fixed rule that all vents should pass straight upon the vertical position, the very opposite is the case in many jobs, as wherever the coke bed is necessary in the venting of the mold all gases must pass



downwards into the coke bed before making their way through the tube D, as shown on the figure.

In top part E I have already stated that the danger from scabbing is almost nil. This is attributable to the fact of the gases making their exit without coming into touch with the metal. It will require no great stretch of imagination to see that when the metal is filled to the top of the mold the gases in the top part fly away quite uninterrupted. This is entirely the opposite of what takes place at the bottom, as we find these seeking to make their way through the surface of the mold and but for good and direct venting to the coke bed and a speedy covering of the surface of the mold while casting, the gases would obtain the mastery with disastrous results.

It is a disputed point with many molders as to whether it is necessary to use the vent wire for the top part or not. Practically I have always discarded it, as I believe all molding sands are sufficiently porous, which makes venting unnecessary and that metal will adhere to any top part of a mold however hard rammed in green sand or imperfectly dried in dry sand. The only thing that can happen with the latter is the extra tenaciousness with which the sand clings to the casting, but it in no way seriously affects the same. This tenaciousness is caused through the dampness generating steam, which more or less comes in contact with the casting the moment the mold is filled. Again, I consider a top part that is not vented to be stronger on this account and has less tendency to be drawn down, as the gases that do generate at time of casting are better held inasmuch as there are no vents in the top whereby they would be able to escape more readily. Thus it will be seen that with the greater pressure of the flat roof the top part is thereby carried up, consequently the danger from drawing down is greatly minimized. But I must not be misunderstood concerning the difference between flat top parts and those that have cores or projections attached that have been rammed from pattern. Wherever there are projections, pockets or anything that is rammed up in a top part which projects from the surface such must be vented and that with the greatest care. With regard to the constituent parts of gases with which this article may be said to have something to do. I make no attempt to determine or find out their character in their varied forms as it is enough for all practical purposes to understand that these are co-existent in and around every mold that is cast, therefore it lies entirely with the molder to understaand that it is a matter of the greatest importance to make sure that he has made full and ample provision for their speedy exit. I cannot in this short article give the difference there is between the venting of green sand, dry sand and loam, but if the figure accompanying this article be studiously mastered, the principles of venting as applied to molding generally will be fairly acquired.

Some Points in Melting.

BY E. J. H. PEARCE.

In my last article I should have gone a little further and made plain some of the other methods of converting pig into hard

iron beside using too little coke. The fact is that there are several ways to convert No. 1 pig into iron that cannot be machined.

One of these causes is poor blast. I am not an advocate of excessive blast, but believe in enough, say 6 oz. at the wind box on a 30" cupola. I once put up a 30" cupola that could not be induced to make soft iron. After trying all sensible things, and some nonsensical things, too, to make soft iron, I found that my only recourse was to use an excessive amount of coke.

Our blower was new. We had given the manufacturers of it a detailed drawing showing the distance from blower to cupola, also the bends in blast pipe, and had bought the size they recommended, and on its arrival had belted it up according to their instructions.

After several failures we put a blast gauge on the wind box and found that we had just 2½ oz. pressuse. This would allow the melting zone to sink so low that it brought the iron in contact with the blast, thereby hardening it.

After figuring over our pulleys again we found that we were running fast enough if the belts were not slipping. Putting a speed indicator on the counter shaft we found that it was not running near fast enough, proving positively that our belts were slipping badly.

The blower had 4½-inch pulleys and the manufacturers instructed us to use a countershaft with 36-inch pulleys belted to the 4½-inch on blower; also with a 10-inch pulley driven from a 30-inch pulley on line shaft.

We took off the 10-inch on countershaft and substituted a 20-inch instead. Replacing the 30-inch pulley on line shaft with a 60-inch, we still had the same proportion but a higher belt speed.

On trying this arrangement we secured 6 oz. pressure, made good soft iron, consumed less coke and lessened the length of the heat.

It is a well known fact that increasing the speed of a belt decreases the percentage of slip. Then, why don't blower makers put larger pulleys on their blowers?

Another way to convert good pig into hard iron in a small cupola is by charging too much at a time. We have two cupolas, one 30 inches and one 20 inches in diameter. We can charge 1,000 pounds pig in the 30-inch and make soft iron, while in the 20-inch we can only charge 200 pounds pig, using the same proportion of coke to iron in each case. The explanation of this is, that in the 30-inch cupola the iron sinks down gradually and does not hang, while in the 20-inch it is easily jammed and hangs until the bed is burned out, then when it does drop it comes into contact with the blast and is hardened.

Twenty inches is rather small for a cupola, but it is a very handy size to have in a jobbing shop, where it is often desirable to melt about 1,000 pounds for a heat. In a case of that kind the saving in coke and convenience of a small cupola is enough to make a fellow feel glad that he has one.

Among the Foundries.

Frye & Shea have erected a new brass foundry at Bath, Me.

The Parrot Stove & Range Co. will erect a foundry at Carthage, Mo.

The Kelly Foundry & Tank Co. has been organized at Elkhart, Ind.

J. H. Horne & Sons are building a new foundry at Lawrence, Miss.

Williams & Booth have opened their new foundry at Worcester, Mass.

Chauncey Castle is operating his new stove foundry in Keokuk, Ia.

Burns, Silver & Co. are erecting a new foundry at Bridgeport, Conn.

D. T. Ford will build a machine shop and foundry at San Angelo, Texas.

The Kelly Foundry & Machine Co. are extending their works at Elkhart, Ind.

Baugher, Kurtz & Co. are building an addition to their foundry at York, Pa.

The J. W. Garratt Brass Foundry Co. has been incorporated at St. Louis, Mo.

The Westbrooks Foundry & Machine Co. has been organized at Danville, Va.

Anderson & Judd are building an addition to their foundry at Edgerton, Minn.

The A. B. Miller Sons Co., Stonington, Ct., is increasing its foundry capacity.

The Logan Manufacturing Co., of Phoenixville, Pa., are building a new foundry.

The Glamorgan Hydrant & Valve Co. has been incorporated at Lynchburg, Va.

The Chihuahua (Mexico) Foundry has engaged in the manufacture of school seats.

The Excelsior Stove Mfg. Co., of Quincy, Ill., is erecting an addition to its foundry.

The Wm. M. Crane Co., of Peekskill, N. Y., are building an addition to their foundry.

Local papers report the E. P. Allis Co., of Milwaukee, Wis., as building a new foundry.

The Gray Iron Casting Co., of Mount Joy, Pa., intend to build an additional foundry.

John Silberzahn has purchased the foundry and machine shop at Redwood Falls, Minn.

The D. Clint Prescott Co., of Menominee, Mich., is erecting a new foundry at that place.

The National Foundry Co., of Erie, Pa., has been incorporated with a capital of $100,000.

The Delta Machine Works, of Greenwood, Miss., have begun operations in their new foundry.

Henry Lang has become associated with Geo. S. Anderson & Bros. Co., of Jeffersonville, Ind.,

The Illinois Sewing Machine Co., of Rockford, Ill., is preparing plans for a foundry 90x120 feet.

Davis, Howe & Co., of Salt Lake City, Utah, are building a considerable addition to their plant.

The Allegan Wheel Co. has leased the foundry and machine shops of John M. Heath, at Allegan, Mich.

Articles of incorporation have been filed by the Duluth (Minn.) Foundry and Machine Company, capital $50,000.

The Globe Foundry Co., of Worcester, Mass., have placed the Martin foundry of Millbury, Mass., in operation.

Wm. K. Gibson has disposed of his interest in the Iron Queen Foundry Co., at Bridgewater, Pa., to John Aley.

The Sprague Mfg. Co., of Milford, Ill., will establish a foundry. A building 66x80 is now being built for this purpose.

M. Even will establish a foundry and machine shop at Port Washington, Wis., for the manufacture of office specialties.

Reports state that Geo. H. Holliday, of Manchester, Ohio, will remove his foundry to Augusta, Ky., in the near future.

William Ward, who has erected a new foundry at Milford, Me., has purchased the machinery of the Foxcroft (Me.) foundry.

The Benedict & Burnham Manufacturing Co., of Waterbury, Conn., is erecting a new foundry 85x93 feet, to cost about $10,000.

The Baltimore & Ohio Southwestern Railroad will increase its foundry facilities by the addition of a new shop at Chillicothe, O.

The Sturgis-Robbins Co. is a new concern organized at Medina, N. Y., to manufacture iron specialties. A large foundry is being built.

The Quincy (Ill.) Stove Co. expect to have their new foundry in operation by September 1st. The management will be vested in Joseph L. Sheridan.

J. K. Lightfoot has purchased the Holmes Foundry, at Cumberland, Md., which has been idle for a long time, and will operate it to its full capacity.

Another iron foundry has been started in Le Roy, N. Y., by J. B. Warren, of Buffalo, who will manufacture a hot air furnace which he has invented.

The Emerson Mfg. Co., of Rockford, Ill., are pushing their new foundry buildings to completion, and expect to have them ready for use by September 1st.

The Standard Foundry Co., of Worcester, Mass., has incorporated with a capital of $10,000. Incorporators, F. T. Williams, C. F. Hutchins, T. T. Booth.

L. H. Norton and James E. Clark have purchased L. Miller's foundry, at Chelsea, Mich., and will hereafter operate it under the name of the Chelsea Plow Co.

The Globe Iron Works, of Minneapolis, Minn., are considering the advisability of building a foundry for their own use. Their chief specialty is gasoline engines.

The Sattley Plow Co. is overhauling the plant of the Decatur Malleable Iron Co. and will shortly place it in operation, turning out principally castings for its own use.

The Draper Machine Co., of Hopedale, Mass., will erect a new foundry which, together with their old one, will make one of the largest foundries in the New England States.

The Warder, Bushnell & Glessner Co., of Springfield, Ohio, will place the foundry of the old Whitely Malleable Iron Co. in operation again, turning out gray iron castings, however.

Local reports from Birmingham, Ala., indicate that the Birmingham Machine & Foundry Co. will rebuild on a larger scale all of its buildings destroyed by fire some time ago.

M. E. Rozelle & Co. have purchased of J. C. Harris the Sheffield (Ala.) Foundry and Machine Works, the consideration being $4,000, and will double the present capacity of the plant.

Messrs. Jones & Devine, Stamford, Conn., who have been doing business under the firm name of the Union Jobbing Foundry, have dissolved partnership. The business will be continued by M. J. Devine.

The N. O. Nelson Mfg. Co., St. Louis, Mo., expects to start its pipe foundry at Bessemer, Ala., about September 1. The works cover 1½ acres and are designed to have a capacity of about 50 carloads a month.

The firm of Moore, Jones & Co., which for twenty-five years past has conducted a brass foundry and machine shop at 3144 N. Broadway, St. Louis, Mo., has incorporated as the Moore-Jones Brass & Metal Company.

O. J. Colton has sold out his entire interest in the Burlington Route foundry, at Aurora, Ill., to the C., B. & Q. R. R. Co. and retires from the management. Mr. Colton retains his position as general manager of G. D. Colton & Co., Galesburg, Ill.

Operations will be resumed immediately at the large foundry and machine shops at Hanover, Pa., by John Fitz, who has leased the property. The plant is owned by the Hanover Foundry and Machine Company, who, about a year ago, asked for a receiver.

Albert A. Tapscott and P. E. Houlihan have leased the foundry and machine shop formerly operated on an extensive scale, of the Somersworth (New Hampshire) Machine Company, which has been idle for eight years.

Carp furnace, at Marquette, Mich., which has been idle for years, will be blown in about September 1 by Charles H. Schaffer and Noah W. Gray. Mr. Gray was formerly connected with the Hinkle furnace, at Ashland, Wis. Carp furnace has an annual capacity of about 11,000 gross tons of charcoal pig iron.

The Sterritt-Thomas Foundry Co. of Pittsburg have made application for a charter of incorporation. The incorporators are Wm. B. Sterritt, David J. Thomas, Henry P. Skilper, Charles Bauer and Edward A. Spencer. The new concern will take over the business of Sterritt & Thomas, founders and machinists, of Thirty-second and Smallman streets, Pittsburg.

The United States Radiator Company, at West Newton, Pa., has purchased the old Markle paper mill property, recently used by the defunct Stewart Manufacturing Co., and will occupy the building as a foundry for making castings for heaters, etc. The Radiator Company employs about 100 hands at present, and, with the new addition to its plant, will hire 50 more men.

The Cherry Valley Iron Works, of Leetonia, Ohio, advise us that the impression held by a portion of the trade that they disposed of their plant to the Republic Iron & Steel Co. is erroneous. They still own and operate their blast furnace, making their regular brand of Cherry Valley American Scotch foundry iron, having only disposed of their rolling mill to the Republic Iron & Steel Co.

A syndicate of which T. G. Bush, of Anniston, Ala., is president has purchased the Clifton Iron Co. of Alabama, owning 30,000 acres of land and two furnaces; the Standard Coal Co., owning 32,000 acres of coal land; the Mary Pratt furnace in Alabama, the Gate City properties adjacent to Birmingham, the Gadsden (Ala.) furnace and large ore properties in connection therewith, four furnaces and several hundred coke ovens. Repairs to some of the furnaces, the building of 400 or 500 coke ovens and the trebling of the coal output are now under way and will be completed within about four months, when the company will have an aggregate capacity of 180,000 tons of pig iron per year.

The North Pittsburg Foundry and Machine Company has been incorporated with nominal capital of $25,000 to engage in a general foundry and steel specialty business in Allegheny, Pa. Plans have been drawn for the construction of a modern plant in Allegheny, on the site of the Carlin Manufacturing Company, the building of which was recently destroyed by fire. The site of the Carlin Manufacturing Company has been purchased by the new enterprise, which from the start will operate to double the output of the old concern. The new plant completed will, from the start, employ 200 men, and the output of the plant will include all kinds of foundry and machine work, besides a large number of specialties

in steel and iron, including water works supplies and a special fire hydrant made according to patents held by Mr. Carlin. Plans have been prepared for all buildings required for the plant. These include the main foundry building, which is to be of iron construction, 70x170 feet, an annex to this building, 50x60 feet, also of iron construction, besides a number of smaller additions.

The Stover Mfg. Co., of Freeport, Ill., write us under date of July 20th: "We have decided to erect a large plant, especially for the manufacture of our line of implements, consisting of wind mills, grinding mills, etc., and will begin operations upon the factory at an early day, to have it ready for use by the first of the year. At the present time we are crowded out of our present quarters by a volume of business entirely too large for it. In establishing a new plant especially for the lines above mentioned we will utilize our present plant for the hardware part of our business and will give employment to a large number of men, and will also increase our efforts in this field. The buildings that we will erect will be of a substantial character and composed largely of stone, brick and steel, and will be mostly one story high. The plant will cover about five acres to start with, and will be constructed on plans that will admit of expansion. Some of our lines we have been obliged to buy outside for the want of sufficient factory room, and with the new plant we will be enabled to manufacture all of our lines in quantities sufficient to meet the wants of our trade."

Personal.

J. C. Bayman will be superintendent of the new Parrot Stove & Range Co.'s foundry at Carthage, Mo.

David F. Light has been engaged as superintendent of the newly organized Lebanon (Pa.) Foundry Co.

Edward Riley, of Beloit, Wis., has accepted the position of superintendent of the new foundry erected by Clinton Burnham at Milwaukee.

John Sturgeon has resigned his position as foreman of the H. S. Merriam foundry, at Millbury, Mass., and accepted a similar position in Batavia, N. Y.

John T. Llewellyn, vice-president and general manager of the Belle City Malleable Iron Co., resigned his position with that company Aug. 1. Together with W. A. Jones, of the Piano Manufacturing Co., and his brother, S. J. Llewellyn, of the Republic Iron & Steel Co., Mr. Llewellyn intends to erect a new malleable plant at West Pullman, Ill.

The change in the officers of the Warder, Bushnell & Glessner Co. at Springfield, O., necessitated by the demise of C. A. Bauer, has resulted in the appointment of C. L. Bauer to the office of manager, Thomas Galley to the assistant managership, and Mr. Clark of the gray iron foundry to the supervision of the foundry recently purchased.

Robert P. Cunningham, for several years foundry foreman of the Henry R. Worthington Pump Works, at Elizabethport, N. J., has been transferred by the International Steam Pump Co. to the Deane Steam Pump Co., of Holyoke, Mass., where he will hold the position of superintendent of the foundries, a promotion which testifies to Mr. Cunningham's ability as a foundry manager.

Fire Fiend.

The Sodus (N. Y.) foundry was slightly damaged by a recent fire.

G. W. Reams & Sons' foundry at Burlington, Kansas, was burned July 28.

The Mellert foundry, at Reading, Pa., was damaged by a fire some time ago.

The Union Iron & Foundry Co., of St. Louis, Mo., were visited by fire July 15.

The Monessen (Pa.) Foundry & Machine Co., recently established, was lately destroyed by fire.

The Glamorgan Pipe & Foundry Co., of Lynchburg, Va., had its foundry destroyed by fire recently, together with valuable patterns.

The Oriskany (N. Y.) Malleable Iron Co. had their cupola room burned recently, resulting in small damage and the stopping of work for a day only.

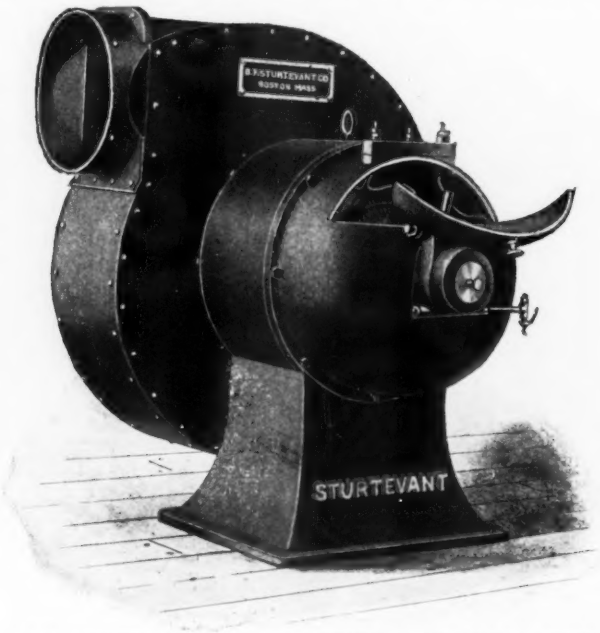
A small blaze took place in the foundry of Wortman & Ward, London, Ont., July 19. Local papers describe it as a blaze in the cupola, which, certainly, should not have caused any great damage.

The plant of the Excelsior Foundry Co., at Bay City, Mich., burned July 8. Loss, $12,500. The plant was included in the

property recently purchased here by the American Ship Building Company, but was still operated by the former owners.

The stove foundry and scale works and general iron foundry of the Burrow, Stewart & Milne Co., at Hamilton, Ont., were damaged by fire July 14 to the extent of $15,000, principally in stock. This is the third time the premises have been destroyed. The first time occurred about fifteen years ago, and a year and a half afterwards, before the building was entirely completed, another fire occurred. Since then the premises have been enlarged.

The immense pipe foundry of the Addyston Pipe & Steel Co., at Addyston, Ohio, which many who visited the plant during the convention of the American Foundrymen's Association in Cincinnati last year, will remember as a model of its kind, was totally destroyed by fire July 17th. While the plant is being rebuilt the company will increase its output from the works at Newport, Ky., thus reducing to a minimum the inconvenience that would otherwise be seriously felt.



AN ADJUSTABLE ELECTRIC STEEL PLATE EXHAUSTER.

An Adjustable Electric Steel Plate Exhauster.

In the adjustable type of fan shown herewith, the fan is supported upon the end of the cast iron motor case, and is so arranged for adjustment that it may be swung round this case as a center, and thus arranged to discharge in any given direction. The enclosed type of motor is exactly similar to the general open types built by the B. F. Sturtevant Co., of Boston, Mass. The field ring is of wrought iron in the smaller sizes, and of cast steel in the larger sizes. To its sides are bolted the hemispherical ends as shown. These ends serve to enclose the motor, while the door on the outer side renders the interior readily accessible.

The motor is of the multi-polar type, the field picese being of wrought iron, the armature is of the barrel wound type, and the commutator is of ample size with large radiating surface. The brushes are of fiber graphite, and the holders of the reaction type. Ring oiler boxes in the centers of the cylindrical ends serve to support the armature shaft, upon the inner end of which the fan is also mounted.

The fan here represented is of the steel plate type, and is open upon one side only, namely, the farthest from the motor. It thus acts as an exhauster, and connection may be made from the inlet to any desirable source.

The fan is designed for either ventilating purposes or for the handling of refuse material of various kinds.

A New Work on Cupola Practice.

Some years ago, and it is not very many years ago either, when books on foundry practice first made their appearance the authors devoted but a comparatively small space to the working of the cupola. The works of Messrs. West and Bolland both refer to the cupola, and Mr. West even went so far as to collect data from many different parts of the country purporting to show the actual cupola practice in each place. But after all it is unquestionably true that more information has been published in technical papers, and it is needless to say that The Foundry has contributed more than its share thereof, than ever appeared in bound volumes. Much of the so-called new light on cupola practice that has been published from month to month has, it is true, been altogether theoretical, and what is worse it has caused some of the foundries, whose management happened to read the advanced theories, untold troubles by trying to imitate what nobody had actually ever accomplished. Some times, when looking back, one can not help but feel, that probably they only meant it as a joke after all, but the joke worked pretty hard on some foundry foremen who were compelled to prove its unreliability by actual experience.

At the present writing, we have in mind an article that appeared in this journal more than a year ago. The writer thereof was connected with some bedstead manufacturing concern that could only at its best utilize a small amount of metal. Of all foundries these are the ones that circumstances would force to maintain a high fuel ratio. Yet this man wrote, as near as we recollect, that they kept an eighteen inch cupola in blast all day and melted at the ratio of one to fifteen!

Not a word of comment will we offer here, but leave it to the judgment of the practical foundrymen, who constitute by far a vast majority of the readers of this paper. Strange to say, not a word was raised against the statements contained in the article referred to.

We can not for a moment believe in this kind of advertising the qualities one never possessed. We like to see any individual show his ability, but we can not countenance direct prevarication. And after all we don't know as those who operate cupolas are as much to blame as those who manufacture them. Instead of claiming a melting ratio somewhat within the bounds of reason the latter have, in order to show extra merit, either yanked the truth out of joint altogether or taken the performance of their cupolas under exceptional conditions. We don't blame a man for claiming all the virtues he can for his wares, but we do doubt that there is a cupola which day after day is melting the maximum rate claimed by its makers.

The book of Edward Kirk entitled "The Cupola Furnace," comes as a pleasant relief from all the high claims of melting to which we have been accustomed. It deals with the subject of melting in a common sense way. Its author has confined himself largely to the practical results of his own experience, which has been very large.

It will be difficult for anyone to appreciate Mr. Kirk's work, unless he has had practical experience around the cupola, and had trouble in getting things to run right. We dare say there are but few that have had altogether smooth sailing with their cupola. There are, it is true, foundries where any kind of melting and any kind of iron will do, but they are in the hopeless minority.

Whatever difference of opinion may exist between the reviewer and the author of "The Cupola Furnace" is such as is always to be found on all questions. Whatever we may say hereafter does not in in the least detract from the value of Mr. Kirk's work.

Mr. Kirk's experience that better results are obtained by charging the iron from two to three hours before the blast is put on in order to insure hot iron is, we believe, open to discussion. It is true that there is but little, if any, fuel wasted by doing so, but we have seen cupolas melt well in an hour after the fire was first lighted.

The author has made the very common mistake of incorporating in the body of his book matter which should not have been presented outside of advertising columns. In Chapter VII., devoted to describing many styles of cupolas, he has allowed different makers of cupolas to have full swing of their imagination. It is true that the author denies any responsibility for the claims made, but after all the reader is apt to forget this. The greater portion of this chapter could have been eliminated without any

appreciable loss to those who buy this book for the information it contains.

In view of past events it is rather surprising to find Mr. Kirk alluding to southern iron as being poor iron. In doing so the author refers principally to stove foundries where "A large amount of high silicon cheap southern iron is being used for the purpose of making a cheap mixture and a soft casting." This iron is blamed for a great amount of breakage in tumbling barrels and during shipment, and a stove foundry in Troy, N. Y., is quoted as saying that a mixture of Pennsylvania irons at $20 per ton is cheaper in the long run than a mixture of cheap southern irons at $14 per ton.

We venture the assertion that but few foundries would want to take an oath as to the truthfulness of such statements.

Mr. Kirk's book on the "Cupola Furnace" is full of good practical sense on the topic it treats. At least the good part of it predominates to such an extent that we can afford to partly overlook what really ought to have been left out. The price is $3.50.

The Alloys of Tin and Lead.

By ERWIN S. SPERRY, Bridgeport, Conn.

(Written for the Society of Chemical Industry.)

Although the alloys of tin and lead have from time to time been the subject of various investigations, the testing machine has not been a factor in such researches. As it was necessary for the author to know what combination of these metals produces the strongest alloy for use as soft solder, the matter was made the subject of an investigation. From the fact that such alloys are in daily use as solders in almost every metal industry, the author trusts that the results herewith collated will be of interest.

The materials used were Banca tin and pure desilverized lead; and, after the requisite amounts had been weighed, they were melted in an iron ladle heated over a coal fire. The temperature was not allowed to rise much above that necessary for rendering the mass fluid, and immediately before pouring, the molten metal was stirred with a pine stick in order to thoroughly incorporate the ingredients. The alloy was then poured into a cylindrical iron mold having the internal dimensions of 1½ inches in diameter and 12 inches in length. The bar so cast was then slightly turned down to give it a perfectly cylindrical surface and to remove any imperfections. The cylinder employed for the compression test was cast in the same mold as the one which was used for making the tensile tests; but a much greater amount was necessarily turned off. While the method of testing the bars for tensile strength presented no unusual difficulties, the question of compressive strength became problematical. On account of the absence of a final point of rupture, it is obvious that the usual method employed for making compression tests of hard metals or alloys cannot be used on soft materials; consequently a different method of procedure was necessary. After an investigation the following method was adopted: A cylinder 1¼ inches in diameter and 3 inches long was used for making the tests, and with each successive increment of load, a reduction in length in a space of 1 inch was noted. When this number equalled 0.10 inches the load was assumed to be ultimate, and was taken for the compressive strength which was employed in subsequent comparisons. Such a point seems to be rational, on account of the bulging of the specimen if the load be further augmented, thus preventing uniformity of results. While the above method was adopted for making the compressive tests of soft metals, it is unreliable for comparison with tests of hard materials; yet it seems to be the most satisfactory manner of testing such soft alloys.

The method used for determining the shrinkage of the various alloys was as follows: The molten metal was poured at the lowest possible temperature into an open iron mold, the dimensions of which were such that a bar ½ inch by ¾ inch by 12 inches long was cast. The mold was made so that the length would be exactly 12 inches at the normal temperature (about 20°C.). The difference between the length of the cast bar and 12 inches determined the shrinkage. While this method is subject to error unless care is taken to maintain a uniform temperature of the mold, if attention is paid to this feature, the results are sufficiently accurate for all ordinary purposes.

The experiments were carried out on combinations of the two metals varying by about five per cent.

It was found that the rate of speed used

for testing greatly influenced the results; in fact, it was found impossible to obtain anything approximating concordant results, even on the same material unless a uniform speed was employed.

Tin, when melted, does not pass through a plastic state, but changes almost immediately from a solid to a liquid condition. A yellow film is often seen on the surface of pigs or bars of tin, and such an oxidation is usually considered a visible proof of the purity of the metal. To a certain extent the indication is of value. The color is of value in another way; it determines the content of tin in solder. Those alloys of tin and lead, up to and including tin 50 per cent and lead 50 per cent, show this color if poured at the proper temperature. Many consumers of solder insist that the better grades of this article shall have such a superficial indication. In experiments made with pure tin to investigate such a formation, the conclusions reached were, that if the molten metal is poured very "dull" (i. e., at the lowest possible temperature at which it will run), none, or, at least, only a trace, of the film makes its appearance; if poured very "hot" (i. e., at a low red heat) a gray film is produced; but if poured at a temperature intermediate between these two points, a pronounced yellow color is given to the surface. Tin poured at a high temperature seems to have a more pronounced "cry" than when poured at a low heat.

The testing machine employed for the experiments with the various alloys was a 200,000 lb. Riehle.

A sufficient quantity of metal (10 lbs.) was taken to ensure normal conditions; proportionate parts of this amount were taken, depending upon the desired composition. Twenty-one experiments were made.

(Mr. Sperry then gives complete details of his experiments, including two tables, and finishes his paper with the following remarks:)

It may be of interest to the reader to know why so much stress has been laid on the plastic feature of the various alloys, and of what value is such a condition when it exists. The property of becoming plastic distinguishes the so-called "wiping solders" from the "ordinary solders," and is absolutely necessary for the successful performance of the operation called "wiping a joint." This phenomenon of becoming plastic when melted is evidently due to the presence of two separate alloys, one of which is more fusible than the other; the fusible alloy allows the mass to be worked, while the infusible alloy prevents the material from running off. The study of the fractures of the plastic alloy reveals their dual composition.

The results of the experiments, together with other data not given above, are as follows:

1. Tin and lead combine in all proportions.

2. The color of the alloys ranges from that of pure tin to that of pure lead.

3. In an experiment made on the rolling qualities, it was found that all the alloys can be rolled in the same manner as that employed for rolling tin.

4. The plastic alloys are not so fluid as the non-plastic compositions unless superheated.

5. The yellow color can be produced on the alloys up to and including tin 44 per cent, and lead 55 per cent; after this point the lead characteristics begin to predominate. In order to obtain the best results the metal must be poured at the proper temperature. It was noticed that metal which had been poured "hot," and consequently devoid of the yellow film, became colored by it on standing exposed to the air for some time.

6. The "tin cry" can be produced from the alloys (starting from pure tin) up to and including tin 50 per cent., and lead 50 per cent; it is nearly absent, however, in last few combinations.

7. The strongest alloy in tension is tin 72.5 per cent., and lead 27.5 per cent.

8. The strongest alloy in compression is tin 71 per cent., and lead 29 per cent.

9. The most ductile alloy is tin 40 per cent and lead 60 per cent.

10. The alloy with the most reduction of area is tin 5 per cent and lead 95 per cent.

11. The best alloy for ordinary use is tin 50 per cent, and lead 50 per cent, as the surface of the bar is perfectly smooth, and free from the matt surface found on some of the other alloys.

12. The alloys from tin 15 per cent, and lead 85 per cent, to tin 30 per cent, and lead 70 per cent inclusive, are not homogeneous; the outside of the test bar fracture showed

a fibrous nature, while the core consisted of granular material.

13. The alloys begin to assume a plastic nature at tin 34 per cent, and lead 66 per cent., and end at tin 15 per cent, and lead 85 per cent. The other alloys do not pass through a true plastic state, but pass almost immediately from the solid to the liquid condition. If an attempt is made to use such alloys in place of the plastic compositions, it will be found that the whole mass will be filled with hard lumps which prevent the successful attainment of the end. The alloys between the limits just mentioned are the so-called "wiping solders," and in commerce are known as 3 and 1, and 2 and 1.

14. The alloys showing the most crystalline nature are those containing from 10 per cent to 20 per cent of lead inclusive.

15. The shrinkage more nearly approaches that of tin, and is considerably less than that of lead. The average shrinkage of solder may be said to be 0.06 inches to the foot.

Importance of Fillets and Round Corners on Modern Machinery Castings.*

BY JOHN M. RICHARDSON.

Take some machine tool casting, a lathe, or planer, for instance, made from 25 to 40 years ago, and compare it with one of the same class brought out at the present time by any up-to-date concern, and what is the first point of contrast noted? You will all answer, "The design." Wherein is this difference of design? It is to a great extent in the large and smoothly-rounded curves and heavy fillets everywhere present in its outline.

Broadly speaking, some of these old style castings look as though a carpenter had nailed together some sort of a foundation, and then, visiting a planing mill, had procured a quantity of moldings, and with them trimmed it very liberally wherever possible, and finally, by some flourish of the magician's wand this would-be pattern had been suddenly transformed into iron and set down in the machine shop adorned with bright red and green paint, or a combination of both, neither "a thing of beauty" nor "a joy forever."

*Paper read at the Pittsburg meeting of the American Foundrymen's Association.

Sharp angles, fancy moldings, panels, etc., look very nicely on doors, store counters and a great many kinds of furniture, but are decidedly out of place and likewise impracticable for cast iron.

I consider it of great importance to have a machine casting designed so that its exterior wil present as smooth a surface as possible, and all angles and recesses of any kind provided with good liberal fillets.

The advantage of this does not lie along any one line, but every one of the four mechanical arts, namely, draughting, pattern making, molding and machine work, which are so closely joined and interlocked as to be but four links of a giant chain, of untold strength and value to mankind, are each and every one benefited thereby.

A drawing where this matter has received attention presents a much more finished appearance, and reflects credit on the designer, for it shows that he looked ahead as far as the foundry, realizing that the design and its resultant casting bear a close relationship to one another. Many a condemned casting is such not through any fault of the molder, but rather from bad proportioning of the metal, sharp angles, no fillets, etc., directly traceable to the drafting room.

In the pattern department fillets serve a very important purpose, and now I am treading on familiar ground, and therefore can, without hesitation, give a short outline of their merits and demerits.

A fillet is actually a pattern strengthener, aside from its foundry value, provided it is composed of a substance having some tenacity in itself, and aside from this property, it is very often a time-saver also, for in fitting hubs, bosses and ribs, over curved surfaces, or, in fact, any part fitting another, where the intersection does not lie in a plane, much time and labor is required to produce a close fit, but a firm bearing can be quite easily arrived at, having, perhaps, rather open joints here and there, and here the fillet aids the patternmaker by effectually hiding the imperfection.

The molder who keeps his eyes open will notice quite a variety of materials worked into fillets on the various patterns he handles, especially if he works in a jobbing foundry. Wood, leather, lead, beeswax and putty comprise the kinds ordinarily used, and they each have their time and place,

except the metallic one. A pattern being of wood has a fibrous nature, which will hold glue or any other adhesive substance, while lead has no affinity whatever for glue; so the only thing that can be employed is shellac or nails. I have used yards and yards of lead fillets, so can speak from experience, and I have seen old engine beds and their foundation boxes returned for repairs, where these fillets were fairly stripped away from the pattern; even the small bunghead wire nails used would not keep them anchored down.

Probably the finest fillet of all is made of wood, worked out of the solid pattern, having no feather edges whatever, but this is a very expensive kind, and can only be used on the finest jobs, so in every-day practice we have to add the fillet to the pattern as a separate part.

For fillets from 1″ radius down to ⅛″, leather is unquestionably the best and most practical material that can be used, and when properly applied will not peel up even with the hardest usage, and requires no nailing whatever, glue being the only agent employed. Those who condemn the leather fillet for patterns, probably do not understand the proper method of applying it. There is a sort of trick about it, to be sure, the key-note of success being hot water. Cover the back of fillet with thick glue, and place it quickly on the pattern, instantly drawing a round ended slicking tool of proper radius along its surface, bearing down hard to exclude any superfluous glue, and following this with a woolen cloth wet in very hot water, to remove all pressed out by the slicker. Repeat this until not a particle of glue squeezes by the edge of the fillet, then wipe with a dry cloth.

This is really not so much of an operation as it may seem from the description and many feet of these fillets can be applied in a very short space of time.

Where it is hard to bind the leather neatly around small curves, etc., just immerse it in hot water, taking it out instantly. This renders it perfectly pliable, but it means quick work, for the thin edges will shrivel and harden at once if not immediately placed in position and burnished down as previously described. A leather fillet put on properly, with strong glue, can only be removed when dry by main force, and will then come off with fibres of the wood adhering to it, and sometimes the leather itself will keep breaking, it takes so much force to make it let go. Light patterns are strengthened by them to such an extent that nails are frequently unnecessary.

Beeswax is all right for very small fillets, and for finishing out where leather ones come together at the top edge of a rib, when the curve is very small, and for many other places. The wax is prepared by being put in a cylinder, having holes of varying diameter in one end. This is warmed and the wax forced through with a plunger, and then applied with a warm slicking tool of the right radius.

If used too cold the fillet will not adhere firmly to the wood. In fact, it is hard to lay wax fillets satisfactorily in a cold room, for both pattern and wax are chilled to commence with, and the heated iron bearing on the top surface of the fillet only makes it difficult to communicate the heat evenly enough through the whole mass to secure a firm contact with the wood, and after the pattern has seen constant use in the foundry, the wax will peel off badly; also it is not a durable substance for a fillet if sunshine or heat of any kind strikes it to any extent.

Putty has always been used in great quantities in pattern making, and probably always will be, on account of its cheapness. Undoubtedly more feet of fillet can be applied in a given time with this substance, for a given amount, taking both the material and labor into consideration, than with anything else, but it is only adapted to cheap work, and not for standard patterns, as it is soft, easily dented, marred or bruised, besides imparting no element of strength whatever to the work. In some places plaster of paris is added to it, to increase its durability, but when this is done it must be used immediately after mixing.

Black putty is also frequently used. This is nothing but common putty mixed with lampblack, and is employed only on cheap work, having but one coat of shellac, this being applied after the sand papering, thus comparing in color with the blacking on the pattern, and saving a second coat.

When fillets are called for having a radius above 1″ then they must be worked out of wood, and this should be done after gluing to the pattern, not before, in order to have

the feather edge adhere as firmly to the work as posible. It is almost impossible not to have the edge curl away if cut out first, and then fastened to the pattern, even if the precaution is taken to have the angle of the fillet made slightly greater than that of the corner it fits, in order to cause a binding of the edges.

A mold of any considerable size can be made more safely, quickly and easily and with a minimum of labor, where these points have been considered in the design, and carefully followed out in the pattern, and with far more chances for a perfect casting, as the danger of cracks in shrinking have been eliminated. How many castings are spoiled by having some slender part joined to a heavier one, with no fillet where they come together, thus causing a crack by the shrinkage strain at the junction, it would be hard to determine.

A pattern heavily rounded wherever possible will certainly leave the sand very much easier and with less danger of breaking the mold, thus saving labor in patching and mending, which is always a form of dead loss to the proprietor on day work, or to the molder on job work, besides being a great vexation to the workman himself.

I would go so far as to say that every edge of a pattern, except on surfaces to be machined later, should be rounded, even if the radius of curvature is so small on some light work, that it can be done entirely with sandpaper, and on brackets, ribs, heading, etc., it is much more satisfactory when one gets accustomed to it to have the edges terminate in a semi-circular section, rather than flat with the two corners somewhat rounded.

This rounding of outside surfaces is necessarily on the pattern itself, but there is something else frequently not on the pattern that is expected just as much to be on the casting, and that is, the fillets. How many molders can testify to getting patterns with a chalk mark all around every corner and rib, and this injunction in two words, "cut fillets," also marked in chalk somewhere on the surface? Once in a great while a case occurs where this is justifiable, but it should be rare. A molder does not profess to be a sculptor, and when he is forced to carve out fillets in the sand, who can blame him if, instead of being the radius of a circle they prove to be the hypothenuse of a right angled triangle. Then, too, there are often places in the mold where it is very difficult to do this, without dropping sand down into parts where it is hard work to remove it, and the result will be an imperfect casting.

Another thing I wish to mention in this connection, although it does not show on the casting except by a fin which must be clipped off before leaving the foundry, is still in the nature of a fillet. When a core is placed in position horizontally, and the cope closed down, the impression made by the core print where it joins the main pattern is liable to be crushed where it enters the body of the mold, unless the molder shaves off the corner so that, at this juncture, the core does not quite touch the edge. This shaving process is done as a foundry precaution, and varies from a slight amount on small work, to perhaps ⅛" or more clearance all around where the core enters the mold, this gradually tapering off to the size made by the core print.

The fact of cores coming in the interior of a casting, and the places made by them being entirely out of sight, is sort of a "will o' the wisp" to some, who imagine that fillets are unnecessary because they do not show. This is a great error. They are just as much needed here as elsewhere, to strengthen the casting, and to help resist strains, and should be put in of a size proportional to the casting to which they belong, but need not be made excessively large, as they frequently are on the outside of a pattern simply for the graceful effect, for these are not seen. Their place is in the core box, and not as a production of the coremaker's trowel or file. It will sometimes happen that a fillet is called for, on what is the top, or open end of a core box, thus making it impracticable for the patternmaker to provide for it. In such cases the core maker ought not to object to making it in the sand, and, as it comes within the casting, and is out of sight, a plain flat damper is all that is required, and the fillets already in the core box will be a guide for the size. Another case showing the utility of heavily rounded outlines and fillets on castings is when they undergo the cleaning process, and they will also pickle and peel more freely, as there are no sharp corners for the sand to stick into, and thus time, and the edges of cold chisels, are saved.

As we reach the machine shop, the man who snags the castings finds no sharp corners full of sand to be scraped out with old files, and as he scours his work down with the coarse emery brick preparatory to painting, he can do much more effective service, for as the stone becomes rounded on the corners with use, it will still clean the large fillets, whereas with sharp corners it could not, and finally, when the iron filler is applied to one of these smoothly outlined castings, it can be sandpapered down easily and quickly, so that, after the painting is completed, the effect, when properly done, is almost like velvet.

Porosity and Shrinkage in Brass Castings.

By C. VICKERS.

I noticed in the April issue of THE FOUNDRY the remarks made by "Forth" on Mr. Wickhorst's article, "Porous Castings and Precluded Gases," with which "Forth" does not entirely agree.

There is a difference between the metal merely oozing out of the gates like beads and the swelling of the same, which indicates porosity. The first mentioned peculiarity is caused by the segregation of the more fusible metals. For instance, in casting hard bronze, it is a common thing to see these beads on top of the gate. If examined, they will be found to be hard, brittle, whitish and very rich in tin. I have noticed the same thing in yellow brass, which is probably caused by the separation of a portion of the zinc. This peculiarity does not necessarily indicate porosity. When, however, the entire head swells up, assuming a more or less convexity, past experience has taught the writer that the castings will be porous. Sometimes the metal will flow from the head, and, in the case of copper castings, I have seen it swell and curl up a couple of inches or more.

The other phenomenon is precisely the same thing, that puzzles Mr. Macauley, whose inquiry and samples of casting were forwarded to me by Mr. Penton, of THE FOUNDRY. In this case a brass ring casting divided into two parts after being machined. This is a phenomenon of crystallization; in fact, the writer believes that most of the shrinkage of brass castings is caused thereby. When a casting comes out hollow on top, when it should have been flat, it is said to be "shrunk." Now what causes this? I have an idea on the subject, which seems to "stand to reason." So I will ventilate it. The more rapidly a brass casting is cooled, the smaller will be the crystals, so it will present a dense solid appearance; the slower it is cooled, the larger the crystals. The sample that I have to hand from Mr. Macauley shows very large and fine crystals on the split surface. This casting was a flat ring, ½" in thickness, and the metal is hard bronze. The metal in contact with the damp sand of the mold is quickly chilled. This forms a skin, and to this skin the metal, as it cools and crystallizes, attaches itself, the crystals becoming larger as they are nearer the center of the casting, because the cooling is slower, as the heat has to pass through a continually increasing thickness of hot metal. Now if cope and drag are of the same depth, the top and bottom skins will cool with equal rapidity and divide the available metal between them. As the metal crystallizes or solidifies it shrinks in volume. Consequently, if the casting is not supplied with metal to make good this shrinkage from some source outside of itself, there is going to be a flaw or cavity in the same. In the case of thin castings, the top crust cools so rapidly as to be able to sustain its own weight, and the casting is of the same thickness as the pattern. It ought to be thinner by the amount of the known shrinkage, which is just sufficient to cause the cracking or separation noticed. A casting that is solid will have cooled more uniformly, the metal will have settled, making the casting thinner than the pattern. The writer would suggest that the metal be thoroughly mixed by stirring, and be poured as cool as possible for this class of work.

In the case of thick castings, that come out "shrunk" on top, the fault is that they have not been properly fed. The feeder, or sprue, whichever has been used for the purpose, and however large, in such a case has "set" before the casting, and has been incapable of performing its duty of supplying fresh metal to fill the vacancy caused by shrinkage. This vacancy has originally occurred in the center of the casting, whose upper crust, not being sufficiently strong to sustain its own weight, has sagged, causing a hollow on top. Pouring hot overcomes this difficulty. This apparently conflicts with the advice the writer gives, to pour the thin castings cool, but only apparently; as

this letter is sufficiently long, I will leave those interested to study it out for themselves and would like to know the result of their observations, because it seems natural for some of us to get hold of things wrong end first, and I would like to make sure I have not done so before going further.

Those Who Are no More.

C. Norsworthy, a well known foundryman of St. Thomas, Ont., died suddenly a short time ago.

Darwin C. Smalley, founder of the firm of Smalley Bros. & Co., at Bay City, Mich., died at that city July 22, aged 68.

James Monroe, postmaster of Kalamazoo, Mich., who died recently, was one of the chief political characters of Southern Michigan. More than half a century ago he operated a foundry at Jackson, Mich.

Dexter C. Bellows, who died a short time ago at Holyoke, Mass., was a member of the "Old Guard" of foundrymen who are fast passing away. For many years he had charge of the foundry department of the Ames Mfg. Co. One of his sons, Lewis E., is general manager of the Deane Steam Pump Co.

The Times Are Changing.

L. B. Blass severed his connection with the Sturgis foundry and machine shop Monday after a continuous connection with the establishment for over 54 years. During that time he has traveled on foot over 32,000 miles in going to and from his work and has outlived 17 bosses and 43 associate workmen. When he came to Sturgis in 1845 the foundry had been in operation several years making plows and small castings. Power for the running of the blower for the cupola was furnished by a tread mill horse power. The establishment was enlarged until at one time 40 men were employed and the product included sawmills, engines, boilers, wood working machinery, plows, cultivators, and a great variety of machinery and implements. Owing to the death of the proprietors and the present owner not desiring to operate it, the establishment is closed, awaiting a purchaser.—Sturgis (Mich.) Dem.

It Works Both Ways.

Forty men employed at Messrs. Ashton & Frosts' foundry at Blackburn, England, as patternmakers, turners, molders, fitters, drillers, and planers, have been summoned at Blackburn under the Employers and Workmen's Act for absenting themselves from work during the recent hot weather, and in each case the employers claimed 2s. as nominal damages. The magistrates gave a verdict for the employers, with the damages claimed.—Iron and Coal Trades' Review.

Combination of Metals.

In a communication recently before the Royal Society of Edinburgh on the heat of combination of pairs of solid metals, Dr. Alexander Galt mentioned that practically there was no heat of combination in copper-silver alloys, but that heat of combination was found in most of the copper-zinc alloys. The maximum was obtained when the metals, considered as bivalent elements, were in proportions approximating to their chemical combining proportions—about 49.8 per cent. copper. With diminishing per centage of copper, the heat of combination gradually diminishes, becoming zero when there was about 30 per cent. of copper. With still smaller proportions of copper, the heat of combination became negative.

Previous to the death of the late Mr. C. A. Bauer the nominating committee of the American Society of Mechanical Engineers had informally chosen him as a candidate for vice-president of the society. As a nomination is equivalent to an election to that office in the society, nothing but death deprived Mr. Bauer from filling this high position. As it is, it offers one more testimonial to the high regard his associates had for him and the sterling qualities that were his, in the shop and out of it, and it is not impossible to imagine that from this place Mr. Bauer might ultimately have found his way to the presidency of the society, than which no higher honor could be placed upon an American mechanic.

Pittsburg, July 18.—No. 2 foundry iron is selling at prices ranging from $20.75 to $21.25. A sale of 900 tons was made to-day in this city, in which the price ranged from $19.35 to $20.15 per ton, the lot comprising three grades. The quotations had been made some time ago. A lot of 100 tons was sold at the maximum price. Some buyers

are holding off. One order for 400 tons of castings has been peddled about for several weeks, which none of the local foundries can fill, which shows how busy they are.

The Reading Iron Company has purchased the Ringgold furnace at Pottstown, Pa., and the land surrounding it from the Philadelphia & Reading Company. It is said the new owners will operate the furnace, which has been cold for 25 years.

Business at the foundry of the Deposit (N. Y.) Iron Co. is so good that another cupola will be put in.—Deposit Courier.

The Buffalo Forge Company has recently received an order for a fan system heating and ventilating apparatus to be shipped to Japan. It is to be used at the Imperial Crown Prince Palace now building in Tokio. The fan is of special design and has an engine of the United States government type direct attached for driving it.

This company at the present time have in course of construction another large order from the Japanese government, including pressure blowers for foundry work, etc. The same company has also secured the contract for the entire supply of the forges and blowers for use in the temporary machine shops on the Port Arthur section of the Chinese Eastern Railroad.

The King Improved Sand Blast Co., of Detroit, report recent sales of sand blast machines to Art Stove Co., Detroit; Peninsular Stove Co., Detroit, this in addition to those installed some time ago; Excelsior Stove & Manufacturing Co., Quincy, Ill.; Kavanaugh Foundry & Manufacturing Co., Rusk, Tex.; Brittan & Mathes Co., Pittsburg; Phillips & Clark Stove Co., Geneva, N. Y.

The F. W. Gesswein Co., of 39 John street, New York, have sent us a copy of their new catalogue of tools and supplies for metal workers. It is printed on good paper, well illustrated and as the publishers assert, "Worth Looking Into." Much information contained in the 504 pages is of daily service to the manager, foreman and workman.

Pig iron is not the only pebble in the price elevation dramatic cast, as tin is rapidly augmenting in value. Last week tin was quoted in London at the modest price of $137 per ton, the highest quotation made in 11 years. Tin has rarely exceeded this latest price as the result of legitimate business influences. In 1888 it was higher, it is true, but this was the result of the Secretan syndicate of France in endeavoring to corner nearly everything in sight in the way of metals.—American Artisan.

The S. Obermayer Co. has just issued a neat pamphlet, describing in detail Orbison's Garnet Wood-Working Machine, which is designed especially for pattern shops. Illustrations of many different kinds of pattern work are shown, together with the time consumed in finishing them on this machine, thus affording a comparison with the same work done by other methods. Copies of this pamphlet will be mailed upon application to the Obermayer Co., Cincinnati and Chicago.

As showing that higher prices for castings are being obtained we quote the price of $28.56 per gross ton for 12 inch pipe recently paid by the city of Lansingburg, Pa., to the Utica (N. Y.) Pipe Foundry Co.

The B. F. Sturtevant Co., Boston, have issued catalogue No. 103. This is their engine catalogue and describes in detail the engines they build for many purposes. Copies of same may be had upon application.

The stove foundry men have had a much shorter vacation this summer than they have had for some time, but none of them appear to object to working.—Taunton (Mass.) Gazette.

At the present prices of iron, steel and coke, the several Carnegie establishments are said to be capable of earning $40,000,000—an amount probably equal to the entire first cost of the whole of them.—Hartford (Conn.) Times.

The Whiting Company report more cupolas being furnished now than at any time in their history.

The Berlin Iron Bridge Company have been awarded the contract for the iron work in connection with the new foundry which the Benedict & Burnham Manufacturing Company is building at Waterbury, Ct.

NOTICE!

Advertisements in this column, 30 cents a line for each insertion About seven words make a line. The Cash and Copy should be sent to reach us not later than the 20th to insure publication.

Answers addressed to our care will be forwarded.

TO SUBSCRIBERS

whose names appear on our **subscription** list, we will give one free insertion under this heading to those in want of positions, the advertisement to occupy a space of not more than five lines. Additional space or insertions must be paid for in advance at regular rates.

FOR SALE—Four t en-ton jib cranes, with jib 27 feet long, in good order, for sale cheap. Address Dawes & Myler, New Brighton, Pa.

WANTED—One No. 4 Roots Blower. State condition, age, etc., and lowest price for spot cash. Address Emerson Mfg. Co., Lawrence, Mass.

FOR SALE—One 15-ton structural iron crane, hand power, equal to new. For particulars and prices address Vulcan Iron Co., Ltd., Newcastle, Pa.

WANTED—Several thoroughly competent coremakers, experienced on large work. None others need apply. The Westinghouse Machine Co., East Pittsburg, Pa.

WANTED—Position as superintendent of foundry by experienced manager. Specialties, chilled plows and agricultural machinery. Address Box 281, care THE FOUNDRY.

FOR SALE—Iron Foundry with factory building attached. Near New York city. The plant may also be rented on easy terms. Address "B. P.," Box 310, care THE FOUNDRY.

WANTED—Thoroughly competent superintendent for large brass jobbing foundry, one used to large and small work. Send particulars. Address "Experienced," Box 308, care THE FOUNDRY.

FOR SALE CHEAP—Lot of well finished pulley patterns in halves, sizes ranging 6" to 24 diameter up to 10" face. Very valuable for foundry doing jobbing work. Address PULLEYS, Box 299, care THE FOUNDRY Publishing Co.

FOREMAN—I want to secure a situation as foundry foreman. Have held positions of that kind before and can give good references. Am accustomed to all kinds of jobbing work and many specialties. Address "Foreman," Box 307, care THE FOUNDRY.

FOR SALE—Controlling interest in a well-equipped foundry plant near Boston, Mass.; is doing a good business, has large orders ahead and is an opening seldom offered; best of reasons for selling. For full particulars address P. T. O., Box 300, care THE FOUNDRY.

FOR SALE, FOUNDRY—Party or parties wishing to purchase foundry can get a bargain; foundry running every day, situated in a town of 12,000; will take all or part in castings; good reasons for selling. Address inquiries to "Bargain," Box 305, care THE FOUNDRY Publishing Co.

WANTED—Foundry foreman who is competent to handle small malleable shop in connection with regular foundry. Must be a man who thoroughly understands the malleable business and is competent to take full charge. Good position for the right man. Address Box 292, care The Foundry.

FOR SALE—One 5-ton jib crane, hand power, blue print and price on application. We also have for sale one No. 4½ Baker blower, now running, melting 5 tons per hour in 40-inch cupola. We are building a larger cupola and require a blower of greater capacity. Address James Leffel & Co., Springfield, Ohio.

FOR SALE—Foundry and machine shop located in town of 20,000 inhabitants in Wisconsin. Besides being a lake port, four railroads offer additional advantages. The business has been established since 1868, and is in a paying condition. Full chance offered for investigation to those who address "Foundry and Machine Shop," Box 309, care THE FOUNDRY.

WANTED—Foundry foreman; an energetic man capable of looking after details necessary to insure good work, and who can show that he has been successful in getting good results with his men; one having had experience in wheel foundry preferred. Salary $1,500 per year. Address, giving full particulars, C. W. G., Box 303, care THE FOUNDRY Publishing Co.

FOR SALE—A foundry and machine shop, situated in Phillipsburg, N. J., on the banks of the Delaware River, directly opposite the city of Easton. Business established in 1872; capacity of foundry, 10 tons per day; machine shop equipped with modern tools and patterns; lot fronts on Pennsylvania R. R., 180x264 feet deep; Address, Vulcan Iron Works, Phillipsburg, N. J.

WANTED—A man competent to take full charge of a foundry largely devoted to manufacturing brake shoes. He must be a thoroughly up-to-date foreman of molders, well up in machine and other modern methods of molding. He must also be experienced in mixing irons and able to take full supervision of the melting. He must also have sufficient mechanical knowledge to understand blue prints and take general charge of the pattern shop. To a thoroughly first-class man a first-class salary will be paid. Address C. S. B. L., Box 302, care THE FOUNDRY Publishing Co.

There are Two Kinds of
ROTARY PRESSURE
BLOWERS

THE ROOTS

AND OTHERS

OUR BLOWERS . . . . . .

represent all the "up-to-date" ideas and embody (what no other . . . . blower can) forty years of experience in the construction of this type of machine . . . . . .

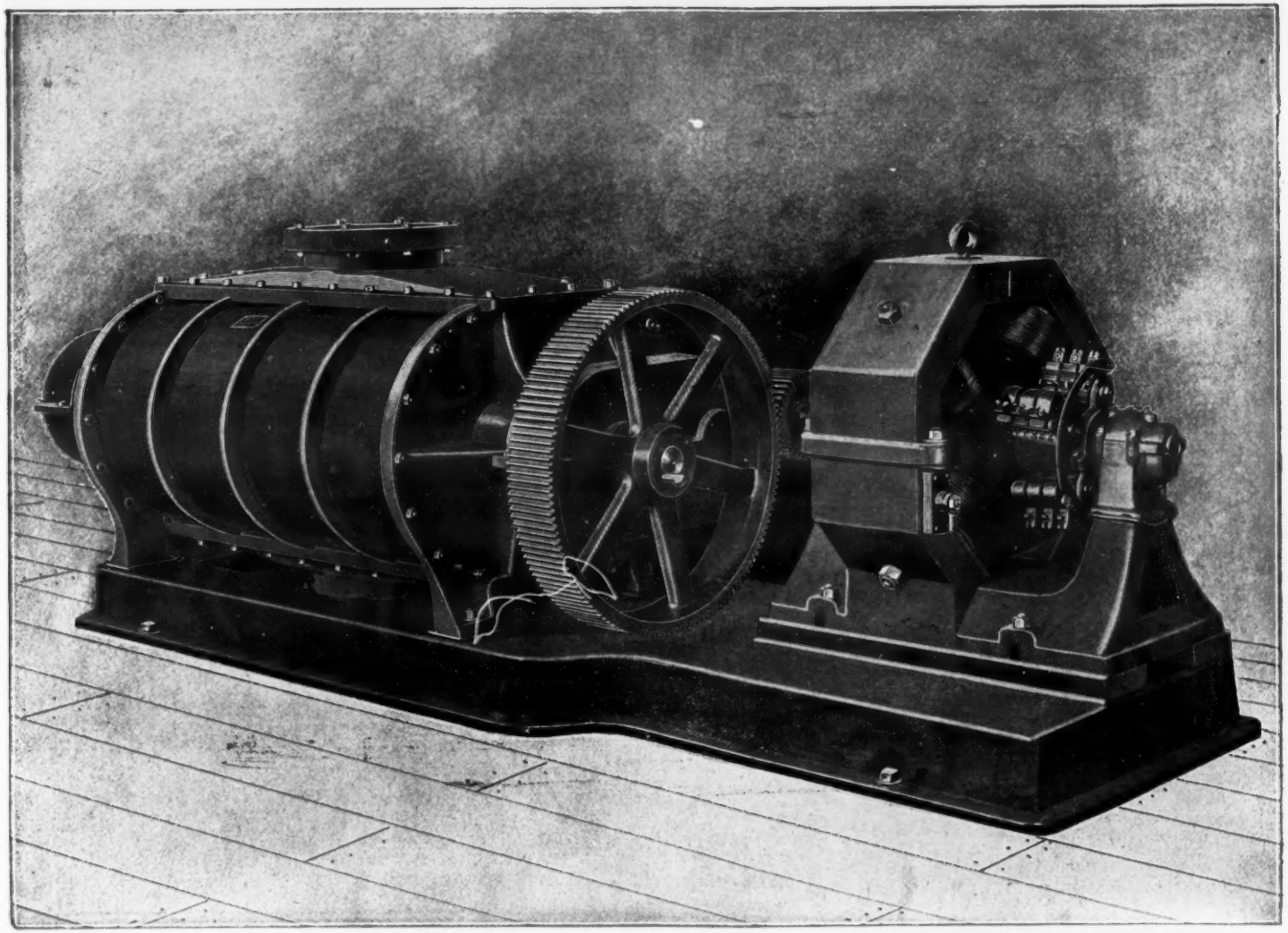
THE ROOTS obtains the *minimum of friction* and the *maximum of efficiency*. Others do not—cannot.

P. H. & F. M. ROOTS CO.,

109 LIBERTY ST., NEW YORK. CONNERSVILLE, IND.
VANDERGRIFT BLDG., PITTSBURG, PA.

AND AMERICAN GAS COMPANY,

222 South Third Street, PHILADELPHIA, PA.



ROOTS BLOWER GEARED DIRECT TO ELECTRIC MOTOR.

THE LARGEST AND MOST RELIABLE FOUNDRY SUPPLY HOUSE IN THE WORLD

Buy the Original and Best!

We make the Standard Facings and Blackings. **All Crude Materials are analyzed** and most thoroughly tested ere they enter the manufacture.

Therefore a Pointer

Please write us for Samples and Prices. All the Blackings we sell are MADE UNDER OUR OWN SUPERVISION and only one quality—

The Best!

Our Facings and Blackings are Guaranteed

Not to Run Before the Metal,
Not to Stick to the Tools,
Not to Cling to the Pattern,
Not to Pull Off the Face of the Mold,

BUT TO PRODUCE

A Bright, Smooth, Clean Casting.

. . . THE . . .

S. Obermayer Co.

CINCINNATI, O.
CHICAGO, ILL.

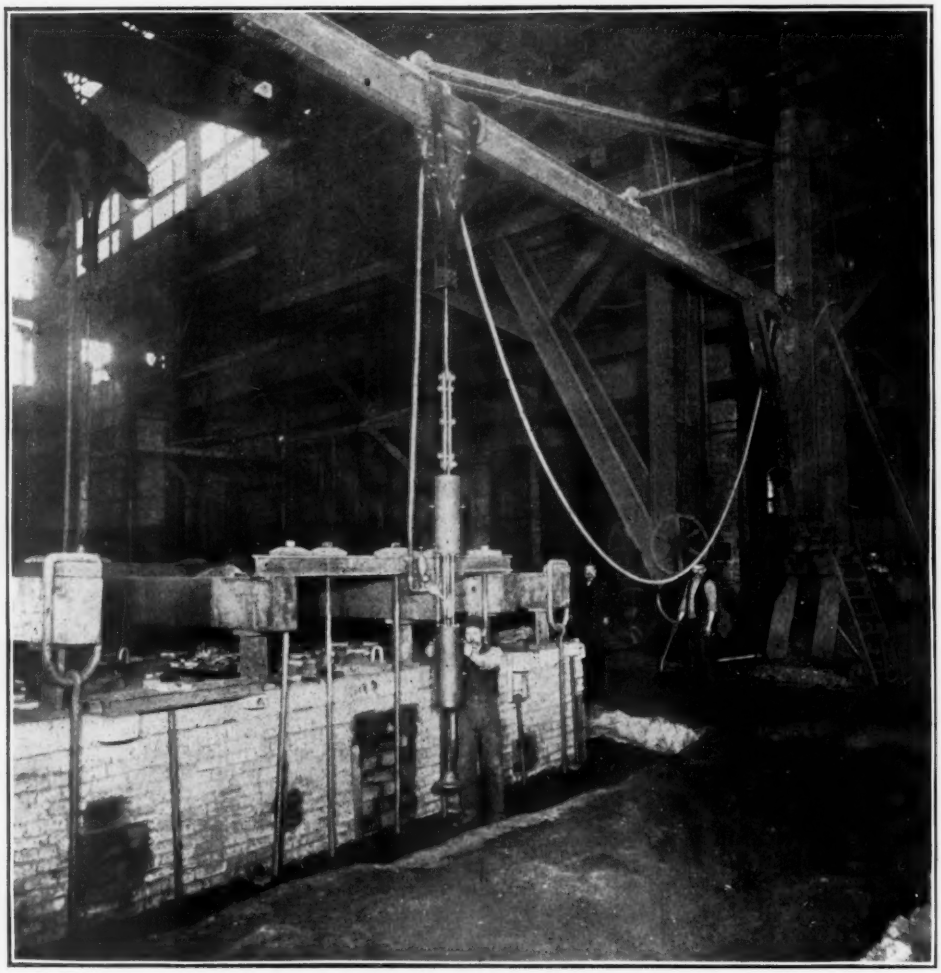
"EVERYTHING YOU NEED IN YOUR FOUNDRY."

Bituminous or Sea Coal Facing

From our Larimer Plant At the Lowest Prices that are now being offered . .

ROOTS BLOWER GEARED DIRECT TO ELECTRIC MOTOR

Cramp Pneumatic Rammer



Invented to save labor in ramming up a mold.

Swung upon a light crane attached to the side of the building or from a post.

A trolley gives it two motions, in-and-out and circular, covering every inch of surface in a radius of 25 or 30 feet.

Can be run by air or steam, compressed air preferable. With a pressure of about forty pounds it strikes 250 times a minute or as desired.

One man handles it with ease and does the work of a dozen by hand ramming.

The sand or dirt is packed with an even pressure.

The mold is secured beyond a doubt and saves metal by uniform ramming.

The mold is rammed up in one-third the time.

No well equipped Foundry can afford to be without this machine.

For further particulars, apply to

J. W. Paxson Co.

1021 North Delaware Avenue,
PHILADELPHIA, PA., U. S. A.

A NEW IDEA! Foundrymen! Control the Gear Business in Your Own Locality!

The day of costly patterns, destructive rapping, and teeth-with-draft is passing; the machine molded gear, made without pattern, and with draftless teeth is here to stay. Why let outsiders ship fine machine molded gears to your next door neighbor, and catch other work?

UNIVERSAL GEAR MOLDING MACHINE. (GROVES' PATENT)

The machine illustrated above is described as Universal, because it is perfectly adapted for the molding of Spur, Bevel, Helical, Staggered or Worm Toothed Gearing (internal or external) from 6 inches to 72 inches diameter, and to 15 inches face; and this variety of work is done without any change of parts, except tooth block,

Groves' Portable Gear Molding Machine

No Jobbing Foundry can afford to be without it. Others use it, why not you?

This simple, economical and inexpensive appliance is adapted for molding the teeth of large gears from 32 inches up to 24 feet in diameter and any face; also rims of Belt and Rope-Driving Pulleys, Band and Fly Wheels, etc., doing away with large, expensive full patters and can be removed from the foundry floor in a few minutes after the mold is formed, thus leaving valuable space ready for other work.

Apply for Price, etc., to the . . Exclusive Agents . . . . . J. W. PAXSON CO. 1021 N. Deleware Avenue, PHILADELPHIA, PA.

50 Years Ago!

50 years ago Joseph Dixon received the above medal for Crucibles of an Excellent Quality.

THAT wasn't the first nor the last medal received, as the **Dixon Crucibles** have won medals and testimonials from all parts of the world, during the seventy years they have been made.

Seventy years of experience and the best equipped factory in the world explain the reason why we are able to make the best black lead crucibles in the world.

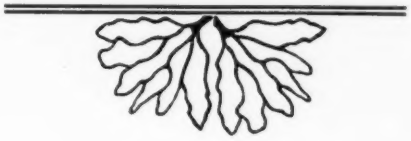
Joseph Dixon Crucible Co.

JERSEY CITY, N. J.

Whitehead Brothers Company,

DEALERS IN

Molding Sand



FIRE SAND,
PHILADELPHIA SAND
FRENCH SAND,
FIRE CLAY, KAOLIN,
FOUNDRY FACINGS
and SUPPLIES
OF ALL KINDS.
LEAD FACINGS
A SPECIALTY.

Albany Sand for Brass and Stove Plate Castings.

537=39 West 27th St.,
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Providence Office,
42 S. Water Street.

Buffalo Office,
70 and 72 Columbia St.

WORKS AT

CHEESEQUAKE CREEK, N. J.
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SOUTH AMBOY, N. J.
WAREHAM, MASS.
CENTRE ISLAND, L. I
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ALBANY N. Y.
CEDAR HILL, N. Y.
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COEYMANS, N. Y.
WILLOW SPRINGS, N. Y.
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CRESCENT, N. Y.

We Guarantee..

That one man with one of our **PNEUMATIC HAMMERS** can do more and better work than four men working in the ordinary way.

These same Hammers are also especially adapted for calking boilers and beading flues.

We also manufacture the best Air Drill on the market, and our Air Hoist and Compressors are especially designed for foundry work.

All tools sent on ten days' trial, subject to approval and are guaranteed for one year.

Chicago Pneumatic Tool Co.,

635 Monadnock Building, CHICAGO, ILL.

P. C. COCHRAN, PRESIDENT.
J. H. WURTZ, SECRETARY.

J. R. LAUGHREY, TREASURER.
J. S. NEWMYER, MANAGER.

WASHINGTON COAL & COKE CO.

CAPITAL, PAID UP, $500,000.

3500 Acres of Coal.

5000 Tons Daily Capacity.

300 30-TON COAL CARS

50 30-TON COKE CARS.

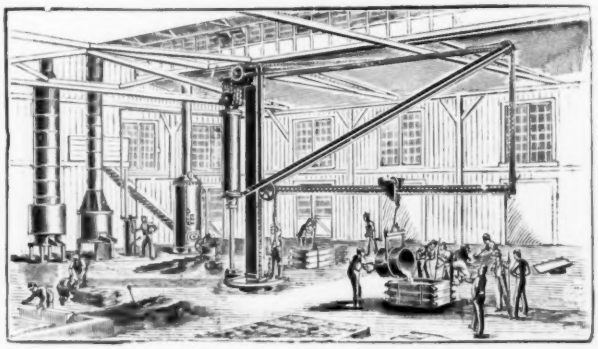
Foundry Coke Our Specialty.

GENERAL OFFICE—
DAWSON, FAYETTE CO., PA.

SALES OFFICE—PITTSBURG, PA.
N. P. HYNDMAN, SALES AGENT.

Do You Suppose We Care

Whether you get Ridgway Cranes or not? If we could keep busy building Ridgway Cranes for people all through the seven lean years since 1892, do you reckon we have any trouble now in this fat year 1899. And so why should we care if you are thick-headed and cannot take a hint?

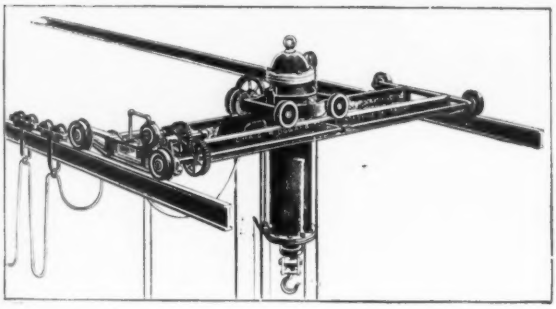


5-Ton Steam Hydraulic Crane in a Foundry.

But we do care just the same and are advertising for you just as earnestly as we ever did. We want to add you to the goodly company of those who sing the praises of the wonderful Ridgway Crane. Did you ever stop to consider that nearly all of the first class establishments in the land use Ridgway Cranes? We do not suppose there is another machine that has such a distinguished following as the Ridgway Crane. The reason for it is simply the wonderful money-making qualities of the Ridgway Crane. If you knew the Ridgway Crane you would have your order with us within the next twenty-four hours.

Just to think of a machine so commonplace as a swing crane—just a swing crane—going into a foundry and working so marvelously that the same molders are able to turn out 50 per cent. more work for same wages.

HYDRAULIC AIR HOISTS.



Which they ain't at all, for they work by air and the hydraulic only comes in on the hold-back. A little oil in the piston rod does it and makes the air hoist a perfect machine.

Only one thing the matter with Ridgway Air Hoists—you can't get them quick. We cannot make them fast enough to supply the demand. So if you are going to get an Oil Governed Hoist, get your order in far ahead of your wants.

"PLEASE TAKE THE ELEVATOR"

If Your Lift is Short, This will Save You Lots.

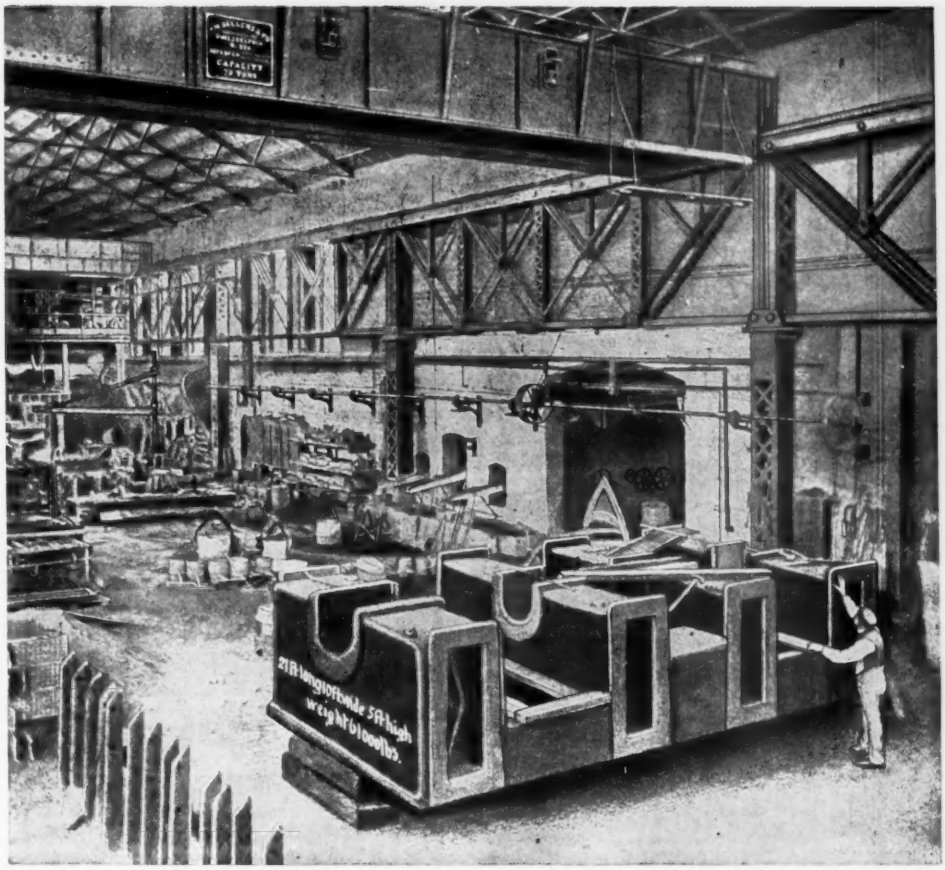
CRAIG RIDGWAY & SON, COATESVILLE, PA.

CHAS. G. ECKSTEIN, 8 Kaiser Wilhelmstr., Berlin, Germany.

William Sellers & Co., Incorp.

PHILADELPHIA.

MODERN FOUNDRY MACHINERY

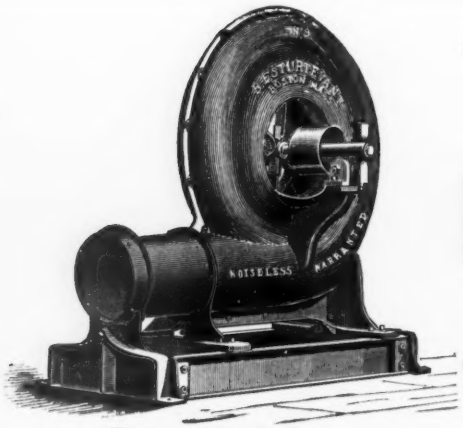


In former issues of THE FOUNDRY we presented a view of our main foundry (204x80 feet) showing in the foreground a green sand mold of large dimensions, with complicated cores, intended for the bed plate of an air compressor for the Calumet and Hecla Mining Company. We give herewith another view of the same foundry showing the casting that was made in this mold.

The handling of such large and heavy work is often a difficult problem to solve in any foundry that is equipped with old fashioned jib cranes. Two electric traveling cranes, one of 30 tons capacity, the other 26 tons, now handle all our work in our foundry with economy and dispatch—having displaced two 50-ton jib cranes, three 25-ton jib cranes, and three 10-ton jib cranes.

We build modern foundry cranes of all kinds, with all kinds of motive power and of all sizes.

We are prepared to meet all possible requirements as to capacity, speed, etc., etc., and any method of driving, and with the **assurance in each case of SAFETY and ECONOMY in working and with least cost for maintenance.** Correspondence on the subject is solicited.



Blower on Adjustable Bed.

THE STURTEVANT STEEL Pressure Blowers,

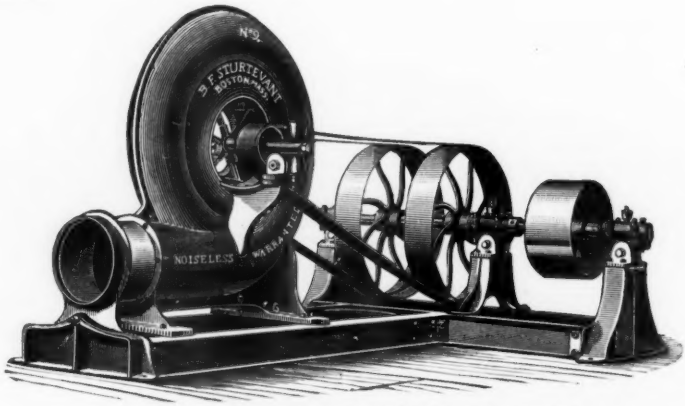
—FOR—

Cupola Furnaces and Forge Fires.

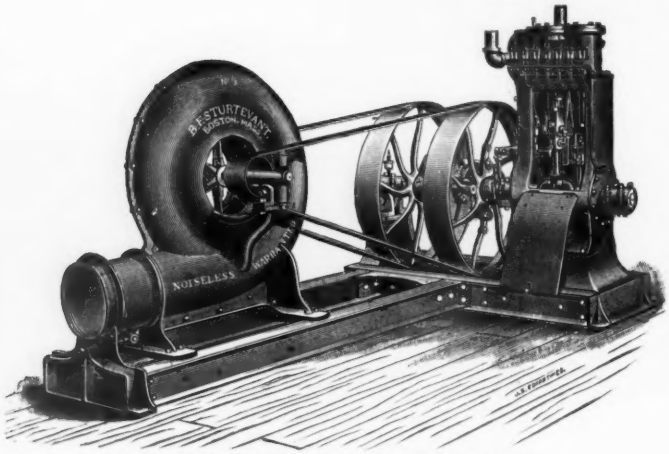
BLOWERS

Furnished without Bed with Separate Countershaft

BLAST GATES



Blower on Adjustable Bed with Combined Countershaft.



Blower on Adjustable Bed with Double Enclosed Engine.

BLOWERS

WITH

THE STURTEVANT

Direct Connected

Electric Motors

Send for Catalogue.

B. F. STURTEVANT CO.,

BOSTON MASS.

131 Liberty Street, NEW YORK, 135 N. Third St., PHILADELPHIA.
16 S. Canal St., CHICAGO. 75 Queen Victoria St., LONDON.

STOCK CARRIED AT BRANCHES.

KING'S IMPROVED

FOR FOUNDRY USE.

PATENT.... SAND BLAST

The Greatest Money Saver Ever Offered the Foundry Trade.

No. 1 Sand Blast

To be used in connection with Centrifugal Blowers.

For Cleaning Light and Ornamental Castings, Stove Plate, etc., Castings of Delicate Construction that are to be Enameled, Japanned, Bronzed, Electro-plated or in any other way artistically finished.

No. 2 Sand Blast

To be used in Connection with Compressed Air.

For cleaning Bath Tubs, Hollowware, Armor Plate, Radiators, Steel and Heavy Machinery Castings; also for Re-dressing discolored Stone Buildings.

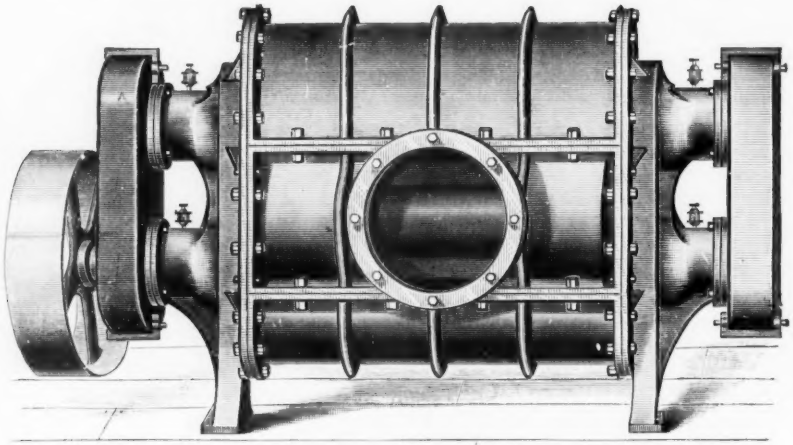
Every up-to-date Foundryman knows the value of a Sand Blast for Casting-Cleaning purposes. If he does not, he is behind the times. Pays for its cost in one month. Large numbers in use, some foundries having three and four.

PRICE COMPLETE READY TO ATTACH TO BLOWER OR AIR COMPRESSOR . . **$75.00.**

FOR FURTHER PARTICULARS, ADDRESS

F. W. KING, DETROIT, MICH.

The Green Rotary Pressure Blower



Working parts are two perfectly balanced impellers, mounted on the best steel shafts, running in bronze bushes, detachable journal bearings, cut gearing at both ends of the Blower enclosed in oil-tight casing.

Weighs less, occupies less space, costs less for freight than any other POSITIVE BLOWER in existance.

FOUNDRY BLOWERS

High Pressure Blowers

GAS EXHAUSTERS

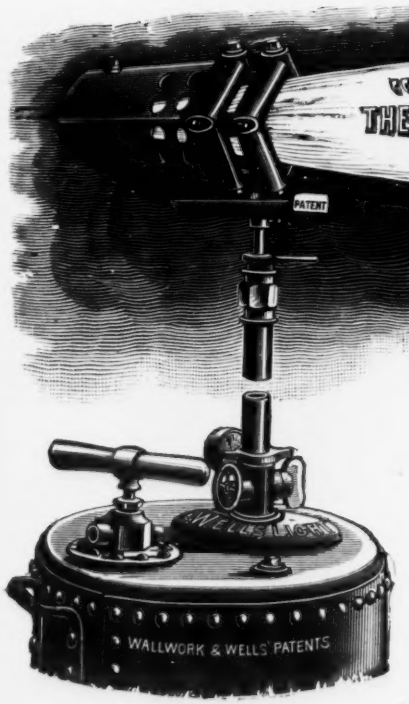
Exhausters for Hot Gases

The GREEN Gives the Most Value for a $.

Wilbraham Baker Blower Co

2518 Frankford Ave. PHILADELPHIA, PA.

Sales Agents: **Frazer & Chalmers, Inc.** CHICAGO, ILL., and BRANCH HOUSES.



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WALLWORK & WELLS' PATENTS

Over 12,000 in Use.

ALWAYS READY!

800 TO 2000 CANDLE POWER.

ESPECIALLY ADAPTED FOR

FOUNDRIES

PORTABLE, SELF-CONTAINED, AUTOMATIC.

NO SMOKE! NO SPRAY! NO SHARP SHADOWS!

Now in Valuable Use With Hundreds of Foundries,

In addition to 400 Railroads and over 500 Contractors.

ROSS MEEHAN FOUNDRY CO.
CHATTANOOGA, TENN., May 5, 1896.

The Wells Light M'f'g. Co., Nos. 44 and 46 Washington St., New York City:

GENTLEMEN—It is contrary to our rule to give testimonials, but an article with the merit of your Wells Light deserves to be made an exception. We have used your lights for the past five years, and consider them indispensable to us.

Yours very truly,
ROSS-MEEHAN FOUNDRY CO.
P. A. BRAWNER, JR., Sec'y. & Treas.

REQUEST CIRCULARS FROM

THE WELLS LIGHT M'F'G. CO.,

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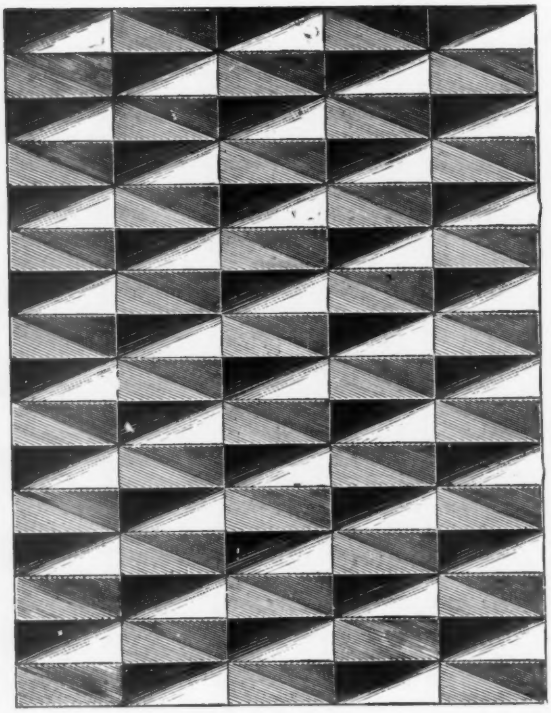

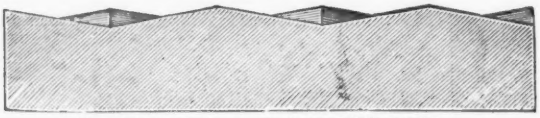

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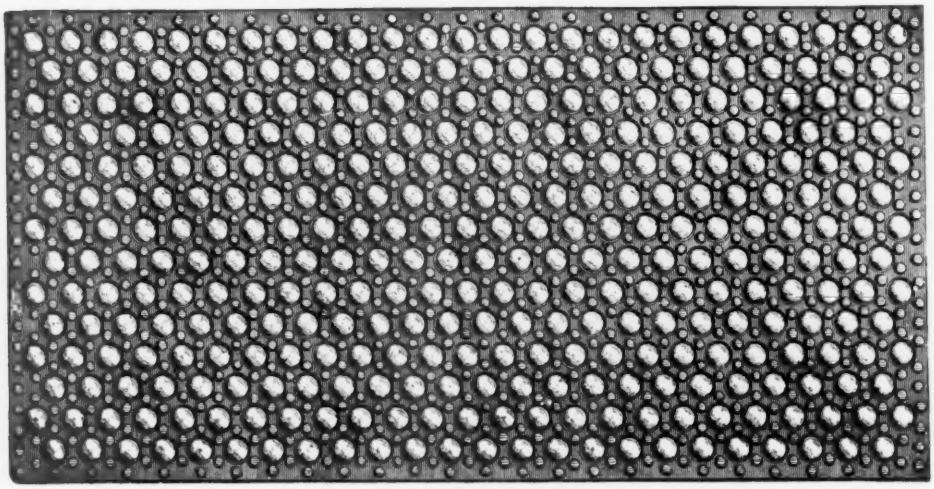

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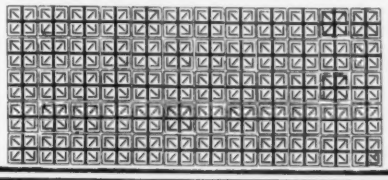

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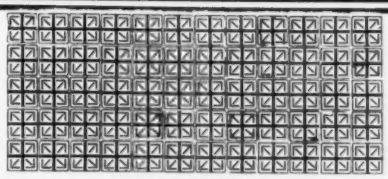

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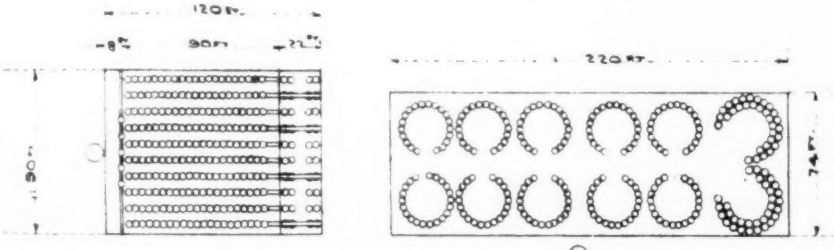

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I can make almost any kind of brass work and in ornamental work—either patterns or quantity—I am in the King row. I can also furnish finished patterns in brass or wood. I also do drilling, tapping and galvanizing.

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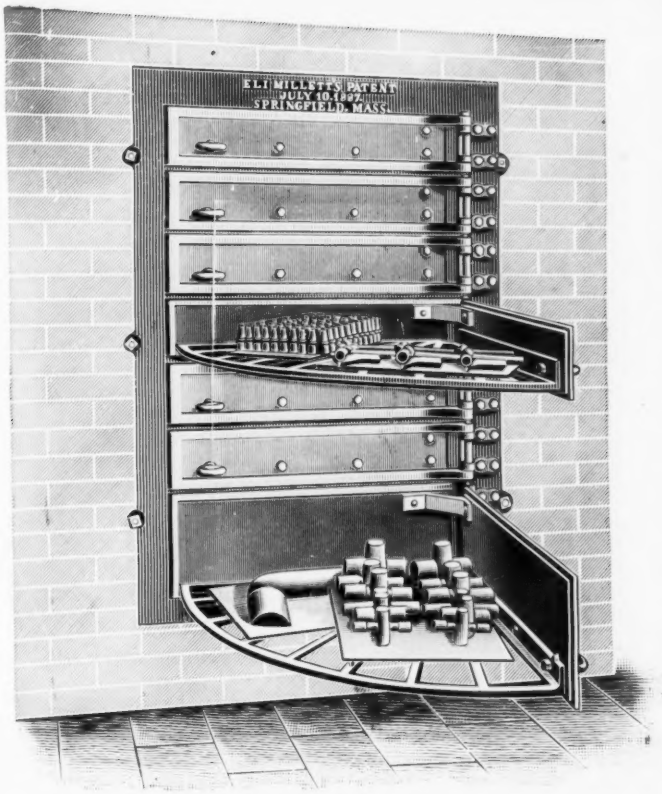

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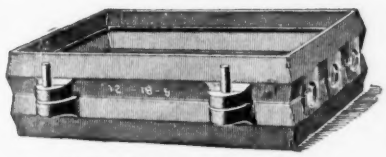

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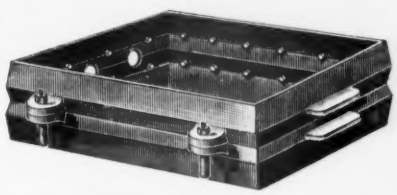

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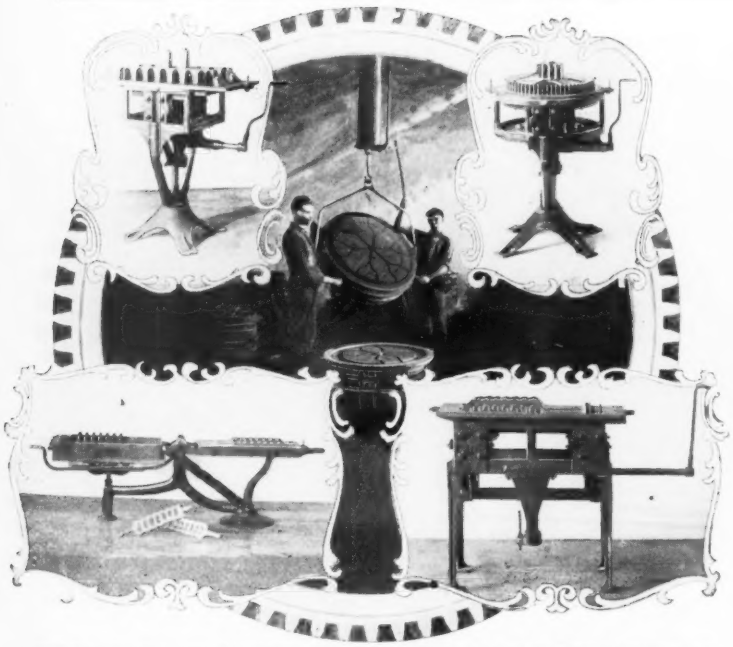

In this Illustration

are shown a few examples of special molding machines built . . for special purposes. No ready made molding machines can . . . compete with them. If you have work for a machine, have one built that will fill the bill. When you get a **"Pridmore"** you get a special machine, and not some stock affair, calculated to mold . . everything and molding nothing.

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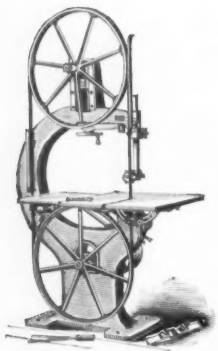

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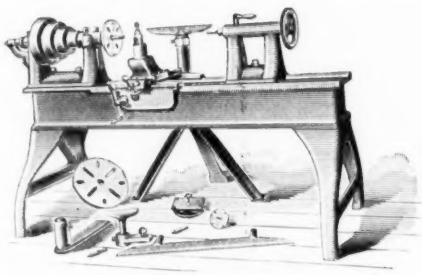

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4 in. and 36 in. Band Saw Machine.

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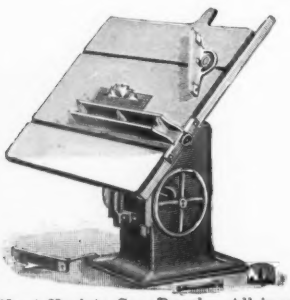

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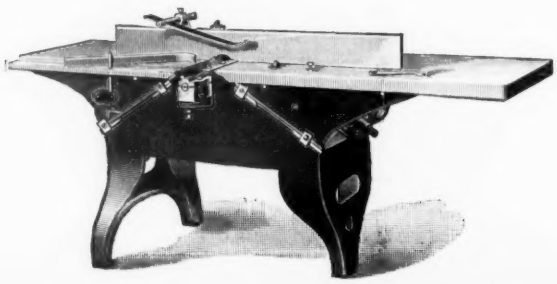

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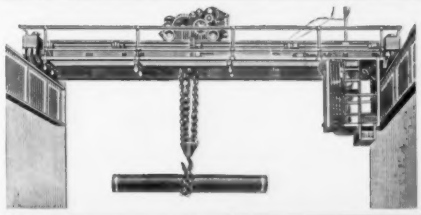

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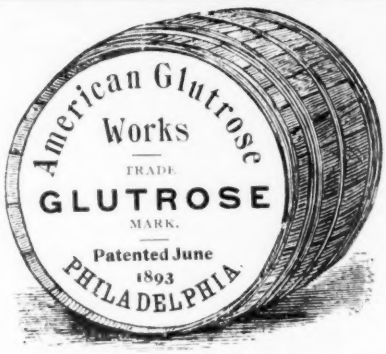

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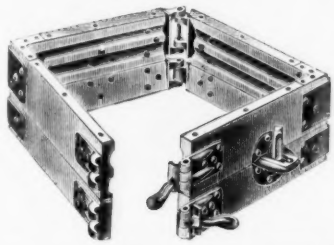

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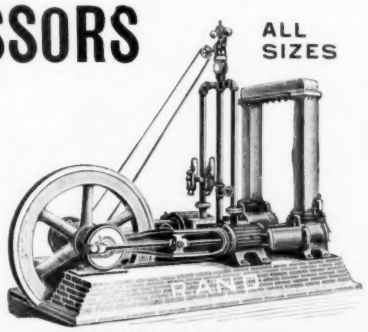

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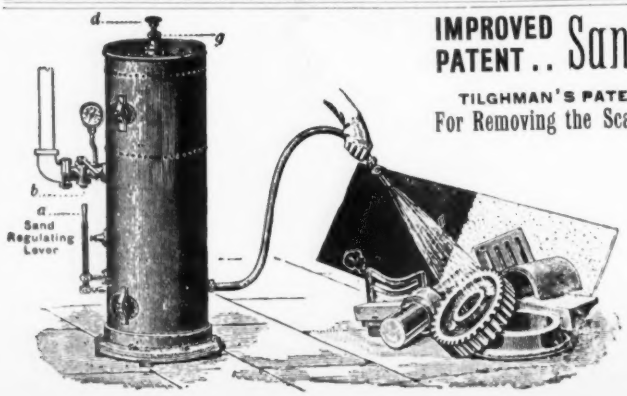

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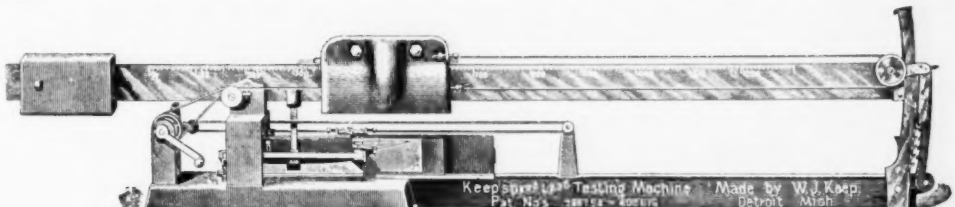

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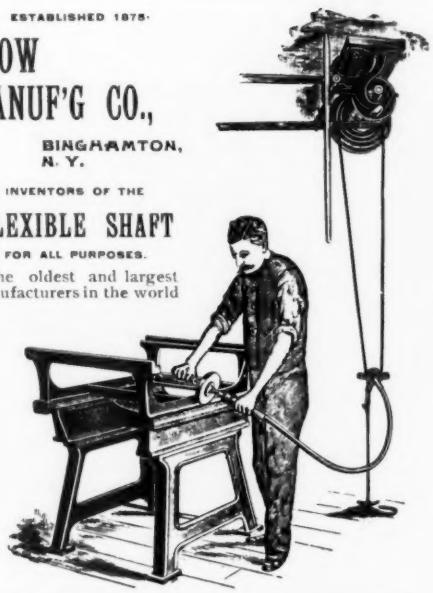

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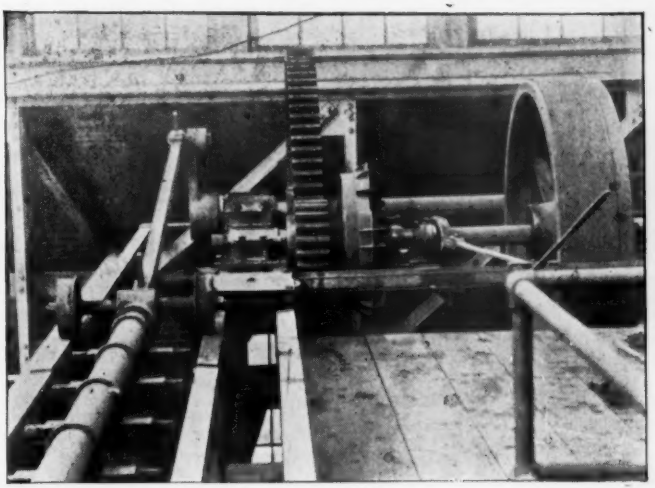
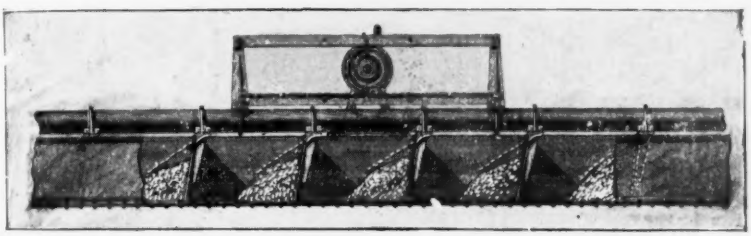
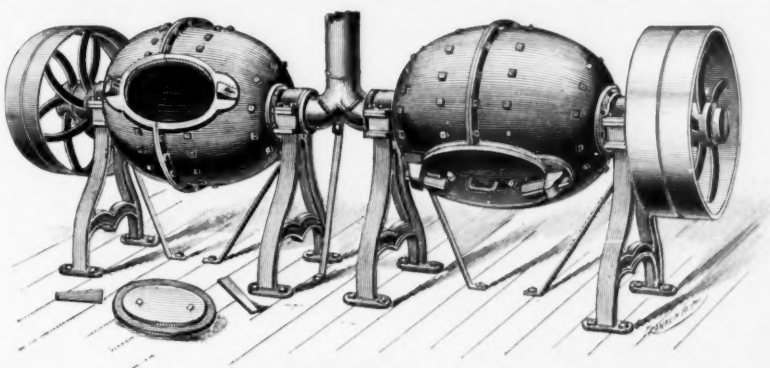




Views of 230-foot Reciprocating Sand Conveyer at Westinghouse Air Brake Co.'s Foundry, . . Wilmerding, Pa.

PATENTS PENDING.

Complete Installations.



A Fine Pair

Stover's IMPROVED EXHAUST Tumbling Barrels

The Stover Egg Shaped Barrel does double the work of any other with less noise and power. It gives the contents a double motion or action—from ends to center and from side to center—causing a thorough mixing and rubbing together of all the parts contained therein, cleaning and polishing the contents better and quicker than any other form of barrel.

Sent on 30 days approval to any responsible manufacturer of light castings, malleable iron wire nails, or any other small articles that require cleaning and polishing.

For full particulars, address,

Stover Manufacturing Co.

205 RIVER STREET, FREEPORT, ILL

E. A. FORD,

GEN. PASS. AND TICKET AGENT, PITTSBURG, PA.

BE WISE

THE GOBEILLE PATTERN COMPANY

(PROMPT AND RELIABLE)

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WE HAVE IT!

THE FINEST SERVICE BETWEEN Detroit and Cincinnati

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LAKE SHORE—BIG FOUR LINE

Through Trains with Parlor and Sleeping Cars leave Detroit from foot of Brush Street, landing you direct in **Grand Central Union Station,** Cincinnati. Positively the only line avoiding depot transfers to any point South.

E. O. McCORMICK, Pass. Traffic Manager, CINCINNATI. H. J. RHEIN, General Agent, DETROIT.

Have you ever seen the record

Made by blast furnace No. 1, Ensley, Alabama? This furnace ran continuously four (4) years and two (2) days and made 253,533 tons of pig iron.

The greatest record ever made by any furnace in the South.

This furnace was lined exclusively with "FRANKLIN CROWN" and "SLIGO" Fire Brick. The best on earth. This record is equal to double the amount of northern ore.

Garden City Sand Co., SECURITY BUILDING, CHICAGO.

Exclusive agents for the Northwest.

DO YOU MAKE LIGHT OR HEAVY

Dry Sand and Skin Dried Work?

IF SO, YOU SHOULD USE

McCORMICK'S

VULCAN BLACKING.

It makes as clear and smooth a casting as the best plumbago and better than the silver leads. Not an experiment—in use in the largest foundries. A trial will satisfy you of its value.

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ARE ALL RIGHT.
SO . ARE . PRICES.
Send for catalogue if interested. ∴ Send sample for Prices on Gray Iron Castings Our **Furnaces**, round steel shell, with drop grate, are up-to date.

LATEST and BEST.

BE SURE YOU GET THE RIB. Patent No. 580,205.

We make . . **Clamps, Boards** and **Other Supplies Castings, too.**

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West's Molder's Text Book

461 Pages.
Fully Illustrated.

Price $2.50, Postpaid; with The Foundry, one year, $3 in U. S., Canada and Mexico; other countries, $3.75.

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AMERICAN FOUNDRY PRACTICE

Presenting the Best Methods and Original Rules for obtaining Good, Sound, Clean Castings and giving detailed descriptions for Making Molds Requiring Skill and Experience; also containing a Practical Treatise upon the Construction of Cranes and Cupolas and the Melting of Iron and Scrap Steel in Iron Foundries.

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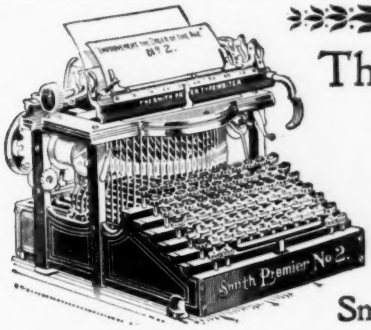

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Send for New Art Catalogue.

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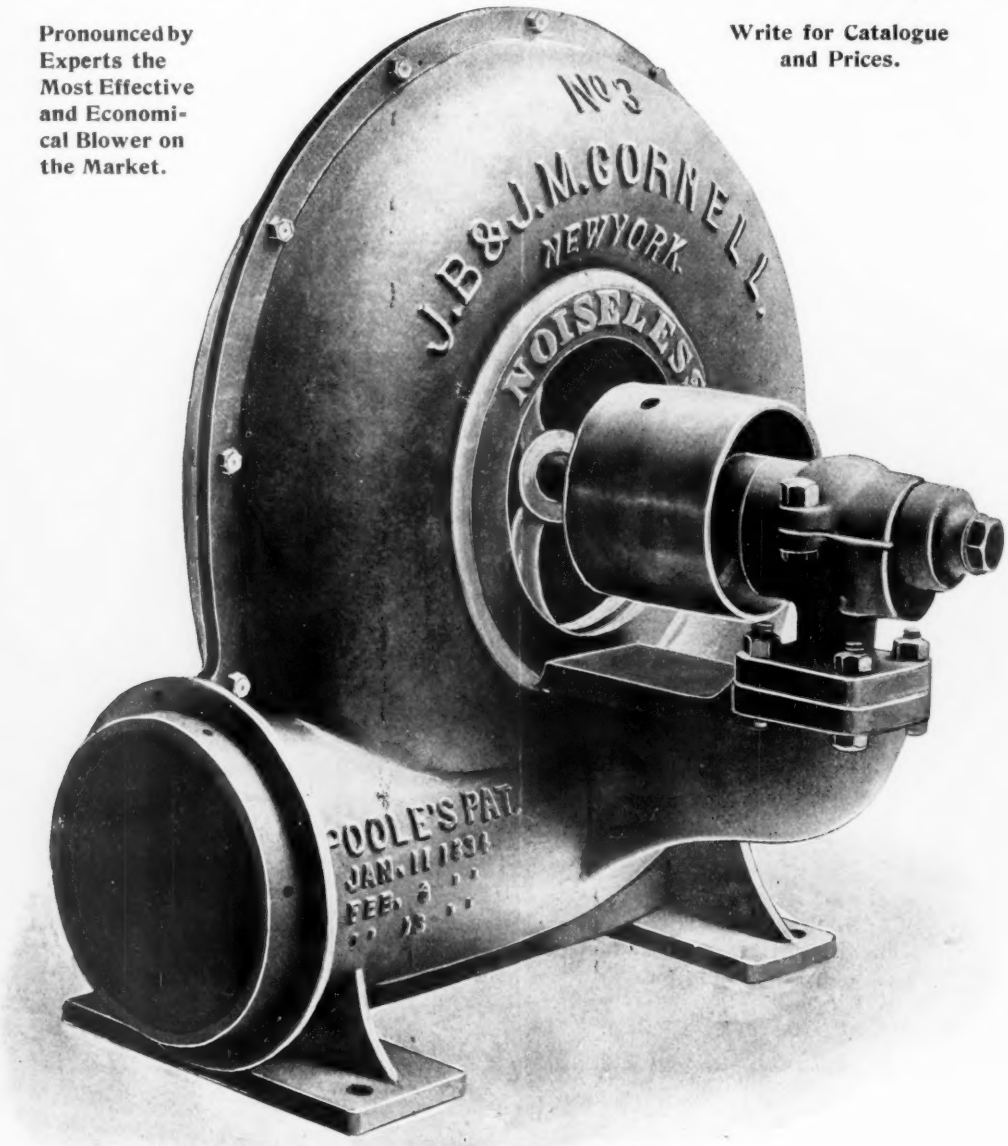
Foundrymen Read THE FOUNDRY

If you want **Foundrymen** to read your "AD" **Place it Here.**

THE POOLE PRESSURE BLOWER

Pronounced by Experts the Most Effective and Economical Blower on the Market.

Write for Catalogue and Prices.



THE LATEST TESTIMONIALS.

MESSRS. J. B. & J. M. CORNELL: NEW YORK, Jan. 28, 1890.

Replying to your favor relative to the blower we purchased of you, we beg to say that we have found it to work satisfactory, and with very much less power than any we have ever used.

JACKSON ARCHITECTURAL IRON WORKS, 315 East 28th Street.

MESSRS. J. B. & J. M. CORNELL: NEWARK, N. J., January 24, 1890.

GENTLEMEN—It gives me pleasure to state that I have given the No. O Blower of your patent sent us, a careful and exhaustive test against a like-sized blower of a Standard make, running both at the same time, from the same shaft, and at exactly the same speed. Your blower gives a slightly higher pressure and fully double the volume of the other. This result was obtained by carefully measuring the area of the discharge openings for the blast from both Blowers and yours would supply an opening of twice the area of the other blower before showing a diminution in the pressure of the blast.

Very truly, JAMES P. WILSON, Supt., TIRRILL'S GAS MACHINE CO., 14 Commercial St., Newark, N. J.

Manufactured and Sold by **J. B. & J. M. CORNELL,** **26th St. and 11th Avenue, NEW YORK CITY.**

Time is Money!

Notwithstanding the great activity in the Iron Industry, we are in a position to fill . . . . .

ALMOST ALL ORDERS
THE SAME DAY AS RECEIVED FOR THE VERY BEST

Foundry Facings
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It is to Your Interest to Trade With Us.

Three Large Factories Running Night and Day to Serve You.

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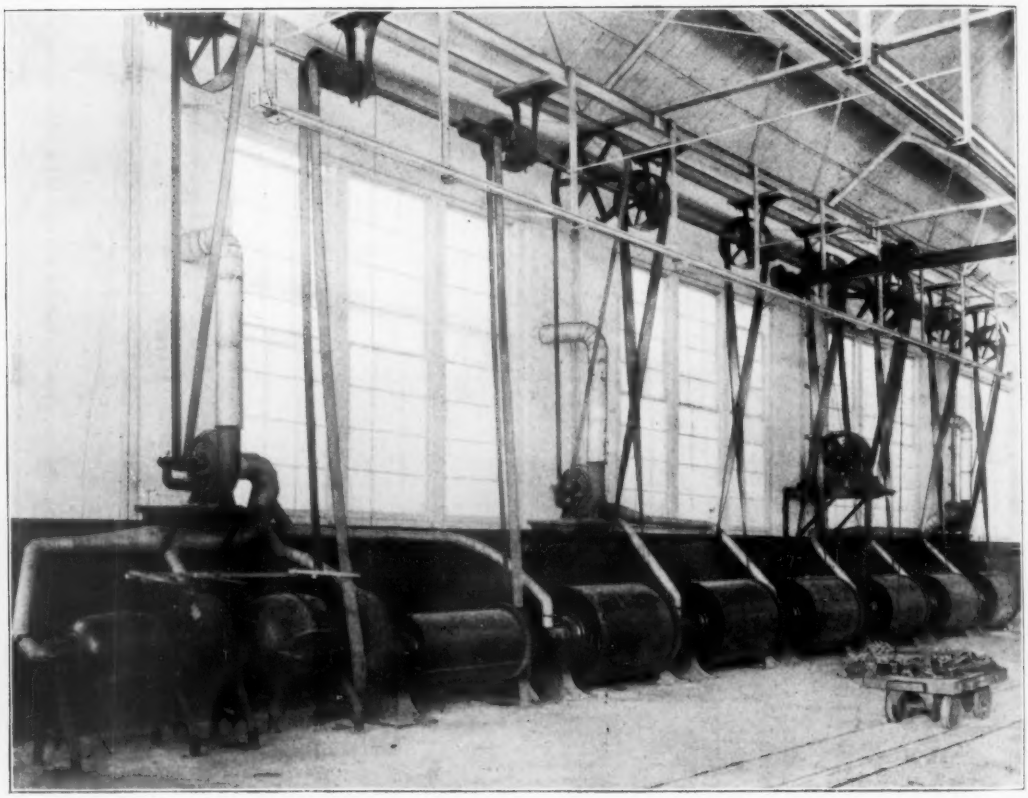
IF you are in a hurry for the goods Telegraph or Telephone us at our expense.

"EVERYTHING YOU NEED IN YOUR FOUNDRY."

Paxson Exhaust Rumblers

MADE OF STEEL.



No Cast Iron Staves

BUT

One Solid Sheet of Steel.

Wide Door Extends Full Length of Mill.
Ribs on Inside to Keep Castings from Slipping.

We have lately installed a large gang of them in the works of the General Electric Company, Schenectady, N. Y., where they are run by electric motors. We also supplied them with two egg-shaped Rumblers, as shown in the cut.

These are the best and most economical Rumblers ever made.

J. W. Paxson Co.

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Paxson-Colliau Cupola

The more you examine it, the better you will like it . . . . . .

The Acme of Science in Cupola Construction . .

All that was Best in the old Colliau Cupola, with Every Improvement suggested by long experience added.

LOCATION AND AREA OF TUYERES INSURE THE HIGHEST MELTING . . . EFFICIENCY. . . . . .

It keeps us hustling to fill the orders for these goods.

MADE ONLY BY THE

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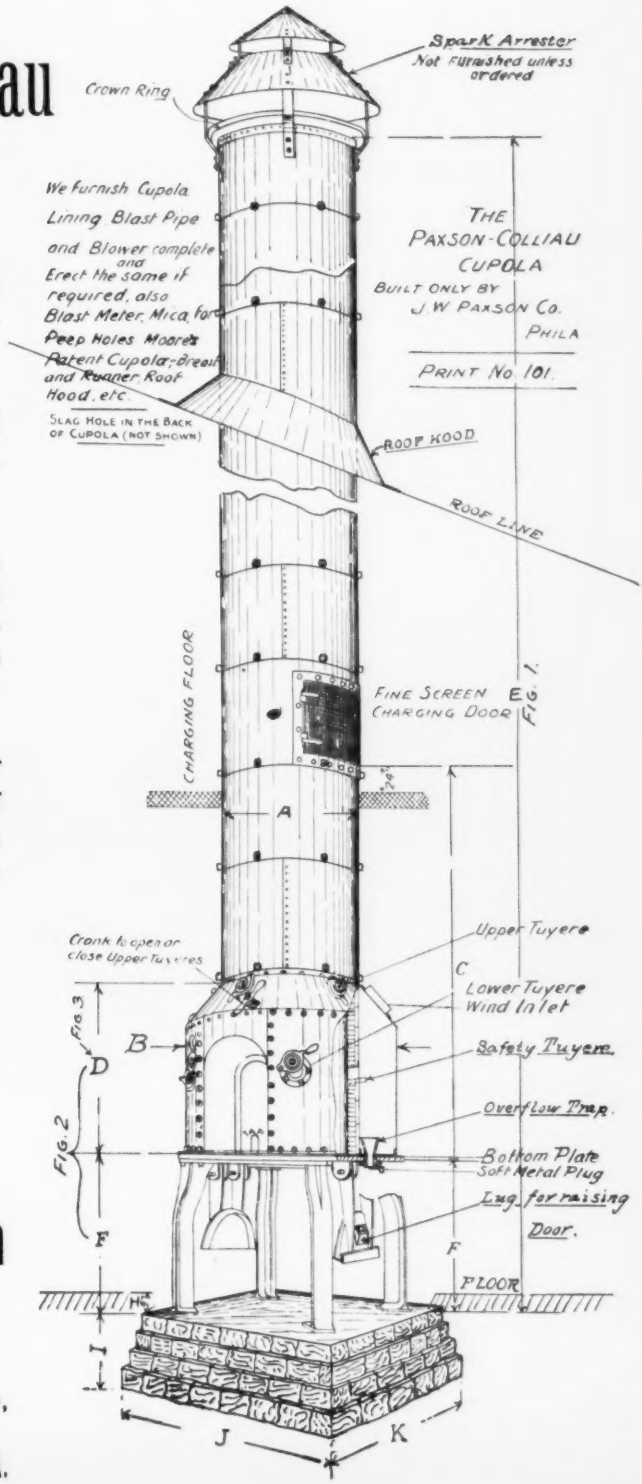

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CRUCIBLES for Brass Melting.
CRUCIBLES for Steel Melting.
CRUCIBLES made specially for the different Metals.

CRUCIBLES for Oil Fires.
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We recognize the fact that different metals and different fires demand different crucible mixtures for the best results and we are prepared in every way to meet that demand.

Although we are the oldest crucible manufacturers in the world, we are up-to-date in every particular, and the knowledge of our chemists and our skilled workmen is at the service of our customers. If you are not quite satisfied with your crucibles or their work, possibly we can help you. We shall be glad to answer any inquiries.

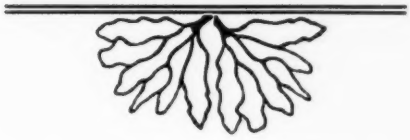
Joseph Dixon Crucible Co.

JERSEY CITY, N. J.

Whitehead Brothers Company,

DEALERS IN

Molding Sand



FIRE SAND,
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FOUNDRY FACINGS
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OF ALL KINDS.
LEAD FACINGS
A SPECIALTY.

Albany Sand for Brass and Stove Plate Castings.

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We Guarantee..

That one man with one of our **PNEUMATIC HAMMERS** can do more and better work than four men working in the ordinary way.

These same Hammers are also especially adapted for calking boilers and beading flues.

We also manufacture the best Air Drill on the market, and our Air Hoist and Compressors are especially designed for foundry work.

All tools sent on ten days' trial, subject to approval and are guaranteed for one year.

Chicago Pneumatic Tool Co.,

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WASHINGTON COAL & COKE CO.

CAPITAL, PAID UP, $500,000.

3500 Acres of Coal. **5000 Tons Daily Capacity.**

300 30-TON COAL CARS — 50 30-TON COKE CARS.

Foundry Coke Our Specialty.

GENERAL OFFICE—
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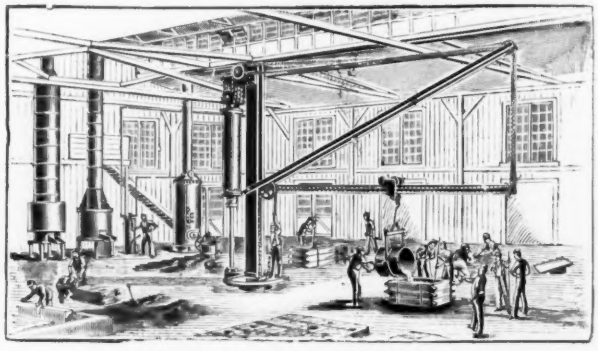
N. P. HYNDMAN, SALES AGENT.

WE HAVE A THEORY

That a crane cannot be too good. A crane is a "stand-from-under" machine. It always works over the heads of men. In a live, going place there is scarcely a minute of the day someone is not under a crane. If a crane fails someone is bound to be hurt.

Yet some men—not you—but some men buy cheap cranes.

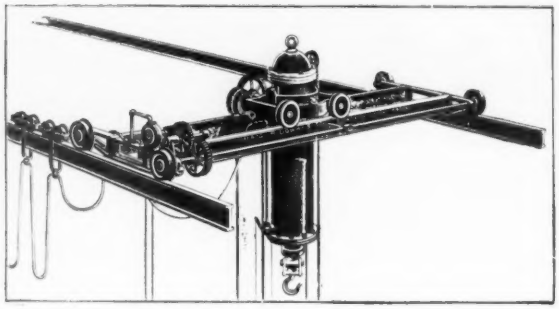
There are lots of cheap cranes to be had and lots are sold, and oh! the long wail that comes into our office from Monday morning until Saturday night: "Ridgway, can you change our cranes to your style?" "Ridgway, can you attach your oil governed hoist to our cranes?" "Ridgway, we wish we had known about your cranes before we got these rattle-traps!" And thus it goes. They wanted cheap cranes and they got 'em.



5-Ton Steam Hydraulic Crane in a Foundry.

It's easy enough to build a crane cheap. We could take a Ridgway Crane and skin it all over from foundation plate to top steadiment and maybe it would not cost very much. But excuse us! Ridgway Cranes are not man-killers. Ridgway Cranes have a name and a reputation for excellence. Because when once erected and put to work that is the end of them, so far as cost is concerned; they are in consequence the cheapest of cranes. No repairs, no breakdowns and delays, no hurt men, no damage suits. We put the stuff into Ridgway Cranes, the best stuff too, and lots of it.

HYDRAULIC AIR HOISTS.



Which they are not at all, work by air direct, same as any other air hoist. We put some oil in the hollow piston rod and that makes the machine an hydraulic. We cannot tell all about them in an advertisement like this. We have circulars for the mere asking. No drummer attachment to the circular either.

The best way is for you to get **Just One** and try it for yourself. The machine at work for you will tell the whole story.

"PLEASE TAKE THE ELEVATOR"

Let the Steam Pipe Lift Your Stuff for You.

CRAIG RIDGWAY & SON, COATESVILLE, PA.

EUROPEAN AGENT,

CHAS. G. ECKSTEIN, 16 Spandauerstr., Berlin, Germany.

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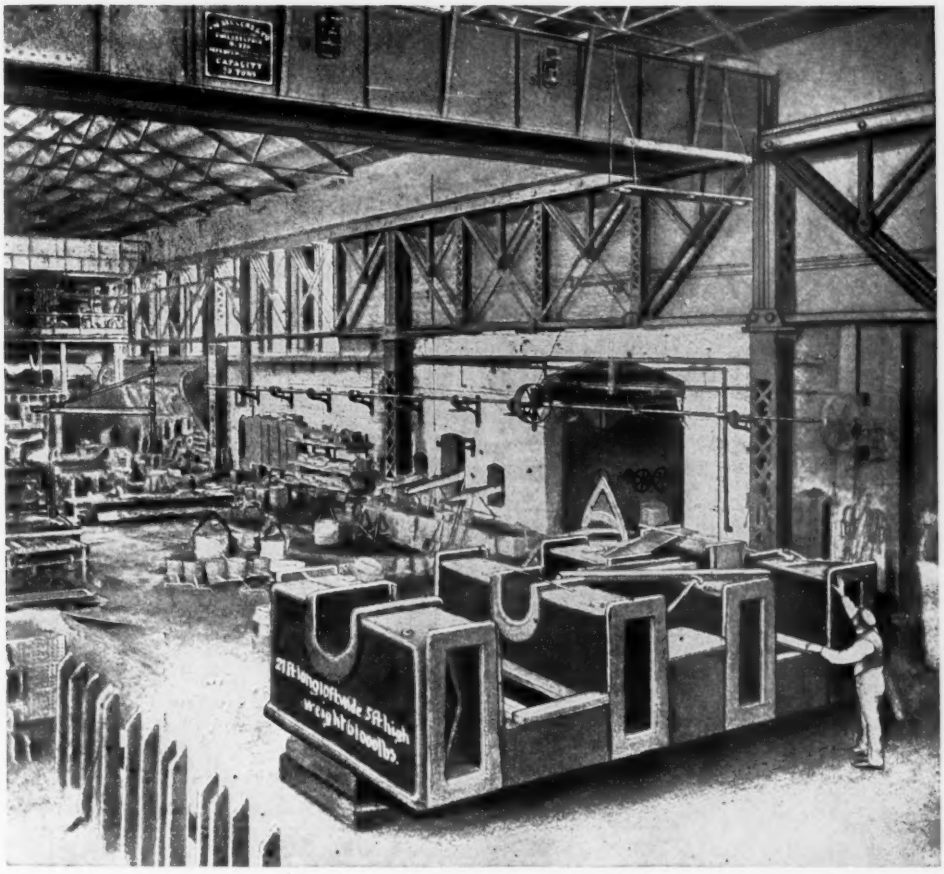
MODERN FOUNDRY MACHINERY

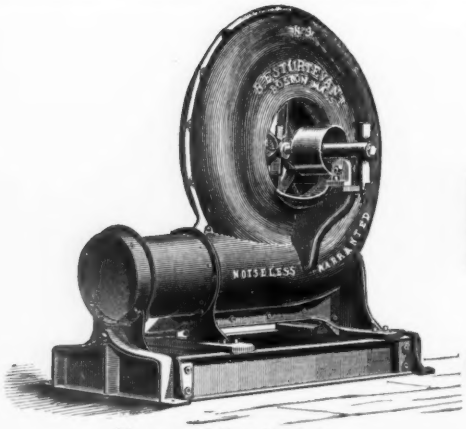


In former issues of THE FOUNDRY we presented a view of our main foundry (204x80 feet) showing in the foreground a green sand mold of large dimensions, with complicated cores, intended for the bed plate of an air compressor for the Calumet and Hecla Mining Company. We give herewith another view of the same foundry showing the casting that was made in this mold.

The handling of such large and heavy work is often a difficult problem to solve in any foundry that is equipped with old fashioned jib cranes. Two electric traveling cranes, one of 30 tons capacity, the other 26 tons, now handle all our work in our foundry with economy and dispatch—having displaced two 50-ton jib cranes, three 25-ton jib cranes, and three 10-ton jib cranes.

We build modern foundry cranes of all kinds, with all kinds of motive power and of all sizes.

We are prepared to meet all possible requirements as to capacity, speed, etc., etc., and any method of driving, and with the **assurance in each case of SAFETY and ECONOMY in working and with least cost for maintenance.** Correspondence on the subject is solicited.



Blower on Adjustable Bed.

THE STURTEVANT STEEL Pressure Blowers,

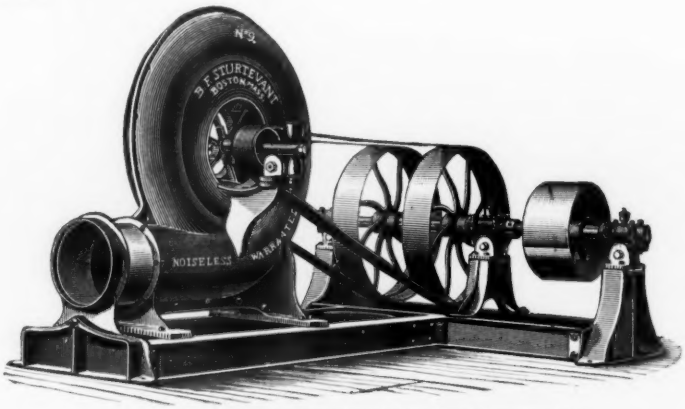
—FOR—

Cupola Furnaces and Forge Fires.

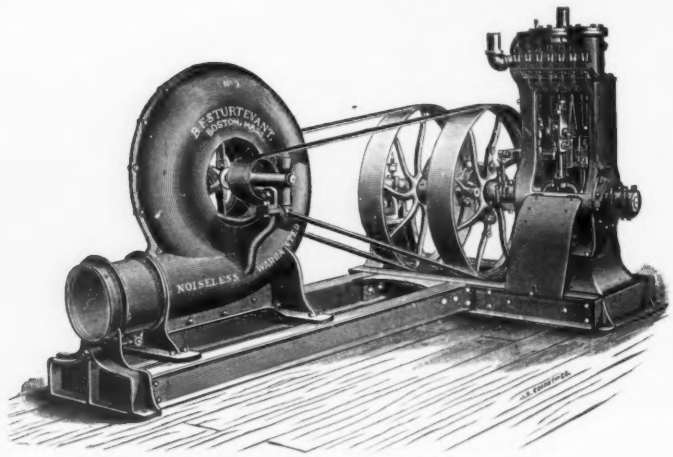
BLOWERS

Furnished without Bed with Separate Countershaft

BLAST GATES



Blower on Adjustable Bed with Combined Countershaft.



Blower on Adjustable Bed with Double Enclosed Engine.

BLOWERS

WITH

THE STURTEVANT

Direct Connected

Electric Motors

Send for Catalogue.

B. F. STURTEVANT CO.,

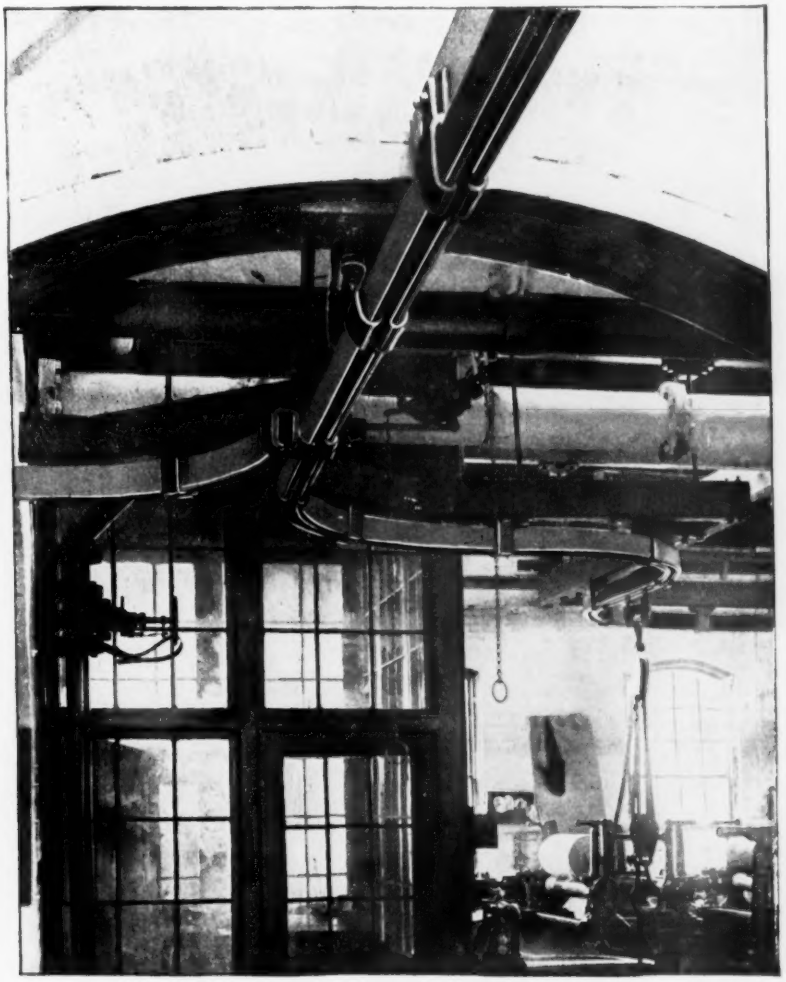
BOSTON MASS.

131 Liberty Street, NEW YORK. 135 N. Third St., PHILADELPHIA.
16 S. Canal St., CHICAGO. 75 Queen Victoria St., LONDON.

STOCK CARRIED AT BRANCHES.

OVERHEAD TROLLEY TRACK.

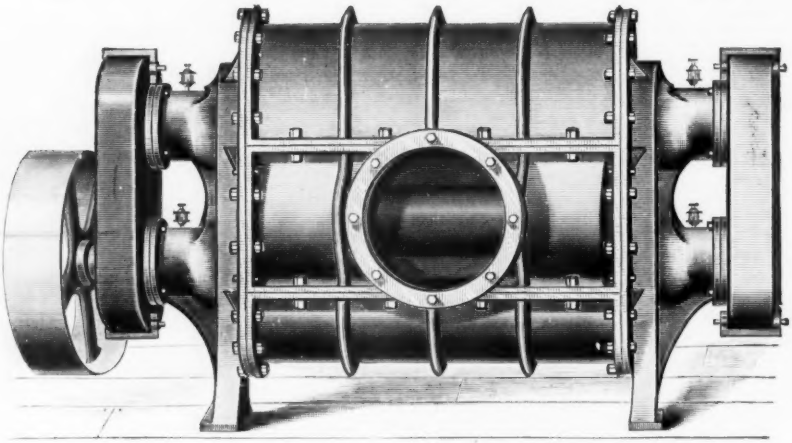
The Overhead Trolley Track occupies no room that can be otherwise employed. It is never obstructed and can be easily used at all times for transportation of materials, machinery or articles of any kind. Its great advantage in most foundries, however, arises from the economy resulting from its use as an aid in getting iron quickly from cupola to floors with a small fraction of the labor usually employed. Our Catalogue (sent free an application) illustrates in detail the construction of parts.



We have foundry customers who are handling 25 to 40 tons of hot metal per day on our Patent Trolley Track Tramway System. It pays for itself in a short time. You cannot afford to be without it. Send detailed sketch or blue print of your requirements. We will reply promptly. We can do you a good turn.

Coburn Trolley Track Mfg. Co. HOLYOKE, MASS.

The Green Rotary Pressure Blower



Working parts are two perfectly balanced impellers, mounted on the best steel shafts, running in bronze bushes, detachable journal bearings, cut gearing at both ends of the Blower enclosed in oil-tight casing.

Weighs less, occupies less space, costs less for freight than any other POSITIVE BLOWER in existance.

FOUNDRY BLOWERS

High Pressure Blowers

GAS EXHAUSTERS

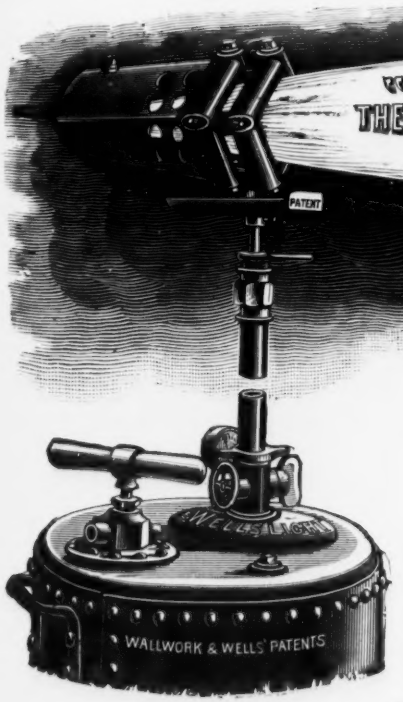
Exhausters for Hot Gases

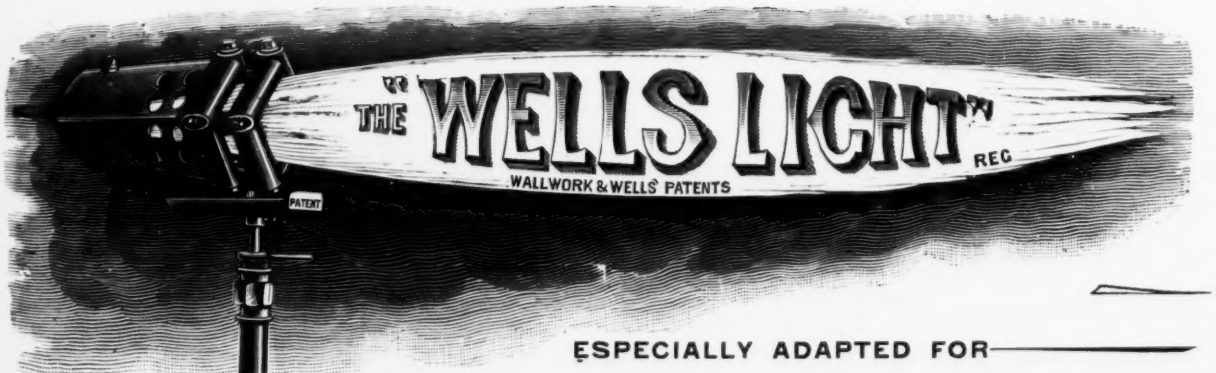
The GREEN Gives the Most Value for a $.

Wilbraham Baker Blower Co

2518 Frankford Ave. PHILADELPHIA, PA.

Sales Agents: **Frazer & Chalmers, Inc.** CHICAGO, ILL., and BRANCH HOUSES.





Over 12,000 in Use.

ALWAYS READY!

800 TO 2000 CANDLE POWER.

ESPECIALLY ADAPTED FOR

FOUNDRIES

PORTABLE, SELF-CONTAINED, AUTOMATIC.

NO SMOKE! NO SPRAY! NO SHARP SHADOWS!

Now in Valuable Use With Hundreds of Foundries,

In addition to 400 Railroads and over 500 Contractors.

ROSS-MEEHAN FOUNDRY CO.
CHATTANOOGA, TENN., May 5, 1896.

The Wells Light M'f'g. Co., Nos. 44 and 46 Washington St., New York City:

GENTLEMEN—It is contrary to our rule to give testimonials, but an article with the merit of your Wells Light deserves to be made an exception. We have used your lights for the past five years, and consider them indispensable to us.

Yours very truly,
ROSS-MEEHAN FOUNDRY CO.
P. A. BRAWNER, JR., Sec'y. & Treas.

REQUEST CIRCULARS FROM

THE WELLS LIGHT M'F'G. CO.,

EDWARD ROBINSON, Sole Proprietor.

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Foundry, Forge, Charcoal and
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PICKANDS, BROWN & CO.,

Manufacturers, Importers
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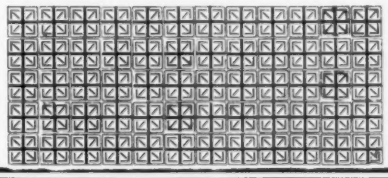

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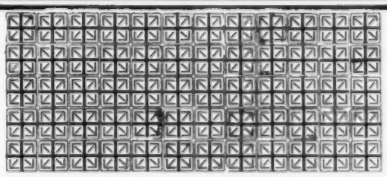

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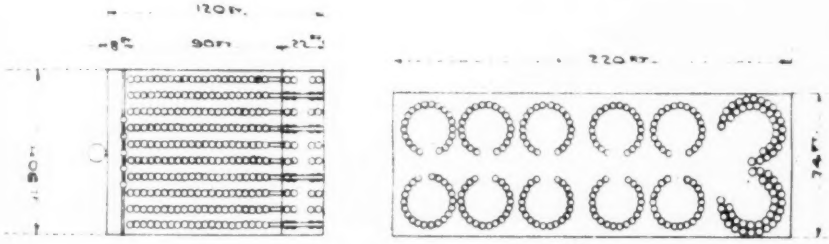
PRONOUNCED SUPERIOR TO STEEL TIRED WHEELS.
IN UNIVERSAL USE ON ALL RAILROADS IN U. S.

Manufactured Most Economically With

THE WHITING SYSTEM

Under the Old Method 50 per cent. more space is required than with the Whiting.



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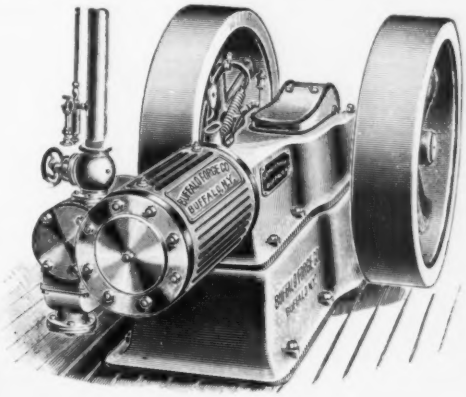

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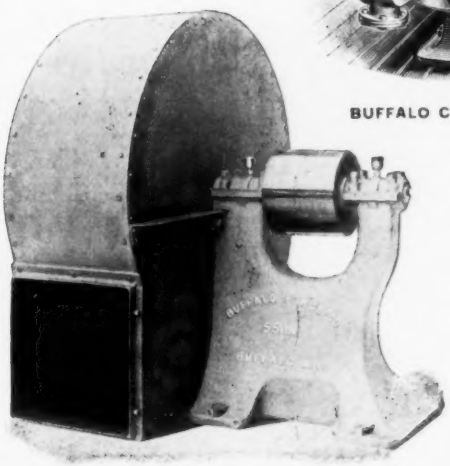

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Our 400 Page Catalogues tell all about these machines, applications, etc.; also Fan System of Heating Foundries, etc.

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Buffalo Forge Company,

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The only foundry paper published in the world, and an authority on all matters pertaining to the foundry business.

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Single subscription to all parts of the United States and Canada, $1 per annum.
" " Universal Postal Union, 1.75 "

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The publishers of THE FOUNDRY appreciate the fact that it is customary for publications, especially the class known as Trade Journals, to quote a rate for advertising from which greater or less discounts are given, according to the persistency of the advertiser. This system is manifestly unfair, as tending to show partiality. We have deducted the usual discount before quoting rates, thus giving it to all alike and no reduction of any sort on the above rates will be made.

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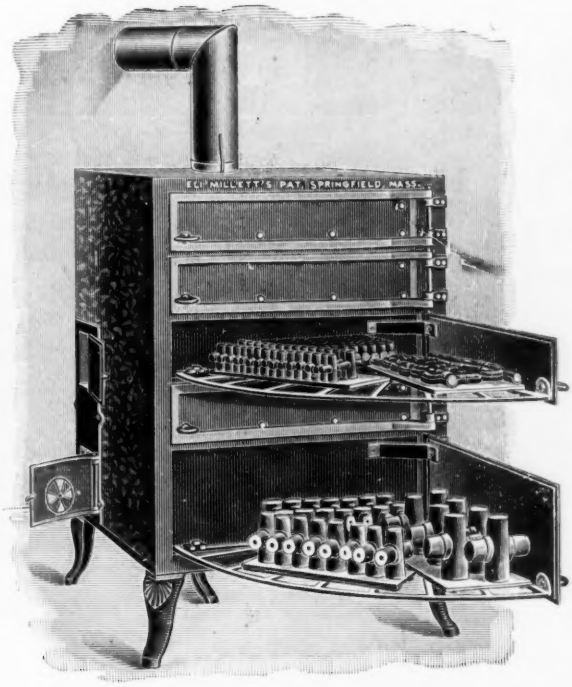

Millett's Patent Core Oven

Double Doors,
One closing the oven when the other is open.

THE BEST IN THE WORLD.

No Foundry using small Cores can afford to be without it.

Over two hundred in use.

Send for our new Catalogue giving names of those using them.

Millett Core Oven Co.

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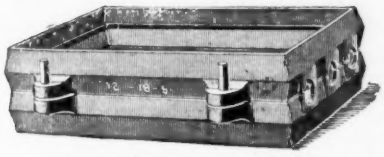
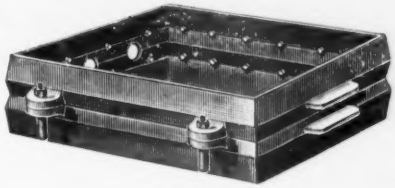
For Sale by THE J. W. PAXSON CO., Philadelphia, Pa., and THE S. OBERMAYER CO., Chicago, Ill.



HORIZONTAL LIGHT RIBBED.

State Size. Ask for Price.

Ribs in Beveled Flasks add to the weight and obstruct ramming—do you want them? You are the Doctor!



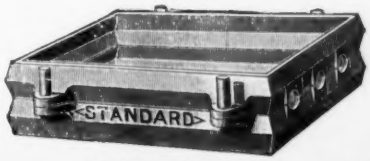
PORCUPINE.
(PAT. APPLIED FOR.) Made in 1898.

Estate of Oscar Barnett.

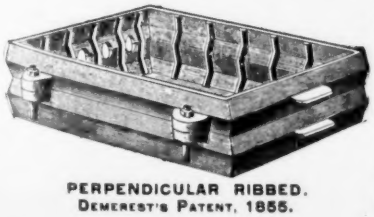
LONG DISTANCE PHONE 1045.
ESTABLISHED 1845.

NEWARK, N. J., U. S. A.

These Flasks are not milled with emery wheels and thrown together, but interchange and are perfectly fitted.



Makers of Everything for a Brass Foundry



PERPENDICULAR RIBBED.
DEMEREST'S PATENT, 1855.

OSCAR BARNETT'S OLD RELIABLE
(Standard Beveled Style.)
IT LEADS.
NOT RIBBED.
Our own foundry insures prompt shipment. Faces planed level; don't rock.

STRAIGHT SIDE, BEAD AT TOP, BOTTOM AND PARTING.

Rights to use these machines for molding malleable iron or steel castings are reserved.

In this Illustration

are shown a few examples of special molding machines built . . for special purposes. No ready made molding machines can . . . compete with them. If you have work for a machine, have one built that will fill the bill. When you get a **"Pridmore"** you get a special machine, and not some stock affair, calculated to mold . . everything and molding nothing.

HENRY E. PRIDMORE, 111-113 W. HARRISON ST., CHICAGO

FOR SALE! ✳ THE SOMERSWORTH MACHINE COMPANY.

The extensive plant and business of The Somersworth Machine Co., located at Dover and Salmon Falls, N. H., is offered for sale.

The Dover plant is located sixty-eight (68) miles from Boston and forty-eight (48) miles from Portland, and consists of 19 buildings and 9 acres of land, situated alongside the tracks of the Boston & Maine R. R., from which a spur track runs to the loading and unloading points of the shops. The shops have a first class power plant of 80 H. P., and the electric light, heating and sprinkling systems are complete.

The Foundry has two (2) large cupolas, one 48 inches in diameter and the other 60 inches in diameter. It is built of brick, 200 by 50 ft., with monitor roof 33 ft. high. The core room is 40x40 ft. and the core sand room is 30x20 ft.

The machine shop is of brick, one story, with the monitor roof 26 ft. high, and is 270x70 ft., and is well equipped with machine tools and machinery for a job shop

The John A. White Co. Machine Shop is of brick, one story, with monitor roof 25 feet high and 160x70 ft. In this department there has been manufactured wood working tools and machinery well known to the trade.

The Stove Works at Salmon Falls are situated on the Western and Northern divisions of the Boston & Maine R. R. and are 74 miles from Boston and 43 miles from Portland. The plant has been in operation since 1848, manufacturing heating and cooking stoves, furnaces, sinks, hollowware and all castings pertaining to the trade, and has put upon the market over 60 different patterns of stoves and there are 100,000 in use in New England to-day.

The plant consists of 22 buildings, 40 acres of land and 8 tenement houses, containing 14 tenements. Has an electric light system and a nickel-plating plant installed last year. The property is in excellent condition and has a well established and profitable business.

The above described plant of the Somersworth Machine Co., including the stock, patterns, machine tools and good will, will be sold as a whole or divided up as may seem desirable. For full particulars and descriptive list of the Real Estate, Machine Tools and Machinery, and the manufactured product of the business, address the undersigned,

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DOVER, N. H.

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CLEVELAND TO BUFFALO

"While you Sleep"

UNPARALLELED NIGHT SERVICE. NEW STEAMERS

"CITY OF BUFFALO" AND "CITY OF ERIE,"

both together being without doubt, in all respects, the finest and fastest that are run in the interest of the traveling public in the United States.

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Leave Cleveland 8 P.M. Arrive Buffalo 6 A.M.
" Buffalo 8 " " Cleveland 6 "

CENTRAL STANDARD TIME.

Connections made at Buffalo with trains for all Eastern and Canadian points. Ask ticket agent for tickets via C. & B. Line. Send four cents for illustrated pamphlet. SPECIAL LOW RATES TO BUFFALO AND NIAGARA FALLS EVERY SATURDAY NIGHT.

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GENERAL PASSENGER AGENT,
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THE
IRON-FOUNDER.

A COMPREHENSIVE TREATISE ON

THE ART OF MOLDING

INCLUDING CHAPTERS ON

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382 Pages—Illustrated with over Three Hundred Engravings.

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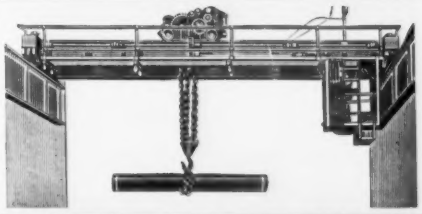

ELECTRICAL STEAM BELT AND HAND POWER

THE CASE MFG CO
COLUMBUS, OHIO.

YOUR IRON CONTRACTS

In making your contracts for 1899 for Lake Superior Charcoal Pig Iron, it would do no harm to take up the question of

"PIONEER,"
"ANTRIM,"
"ELK RAPIDS."

These three brands have given satisfaction in car and malleable work for years in the past and will continue to do so for years to come.

Superior Charcoal Iron Co

911, 912, 913 Michigan Trust Bldg.,
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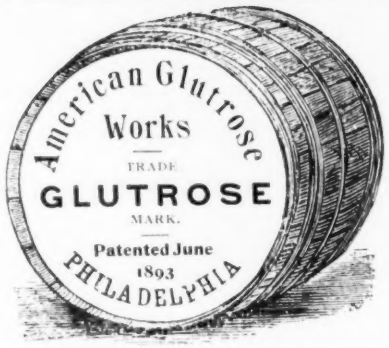
GLUTROSE CORE COMPOUND



Used in the Penna. R. R. foundries and other first-class foundries throughout the United States and Europe.

NO BLOWN CASTINGS.

Makes first-class Radiator Cores without Rods.

Send for Samples and Testimonials.

AMERICAN GLUTROSE WORKS

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WE MANUFACTURE

PLUMBAGO CRUCIBLES

FOR MEN THAT

UNDERSTAND

using them and then they cannot be surpassed in durability; 90 heats have been attained from one crucible. Send for testimonials, quantity and sizes wanted, and we will quote you figures.

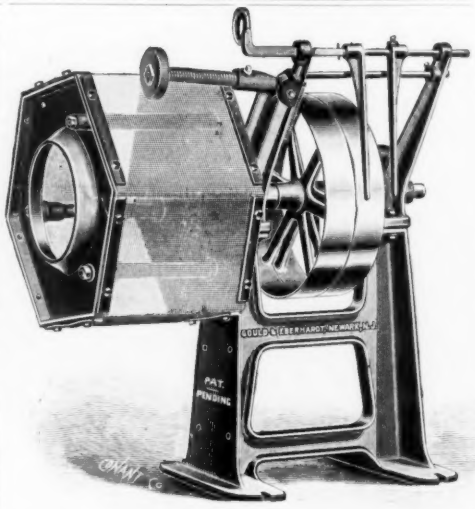
Ceylon Plumbago

PURE and HEAVY, is the only material for FACINGS if you want a bright smooth casting or for a Lubricant or Stove Polish, etc.

We keep it for sale.

Hussman Crucible Co.

ST. LOUIS, MO.



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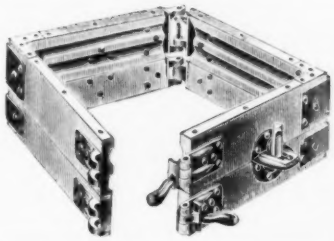
Messrs. Gould & Eberhardt, Newark, N. J.:

GENTLEMEN—As to the working of the Sand Sifter, it is *more than satisfactory*. After using a shaker, which not only shook the sand, but also shook itself apart periodically, it is a great relief, doing its work *quietly* and *thoroughly*, and we shall be pleased to recommend it to anyone you may refer to us. Yours truly,

BELL & FYFE FOUNDRY CO.

GOULD & EBERHARDT, NEWARK, N. J.

EUREKA Improved SNAP FLASK.



A Snap Flask that is always reliable. Heavily bound on both edges with band iron—strong, durable. We sell the "Eureka" cheaper than foundrymen can make **any** flask for, much less such a flask as this. Write for discounts.

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LIQUID CORE COMPOUND

Used by many of the largest and well-known Iron and Brass Foundries in the United States, Canada, Great Britain and Germany. It is the standard article for making cores.

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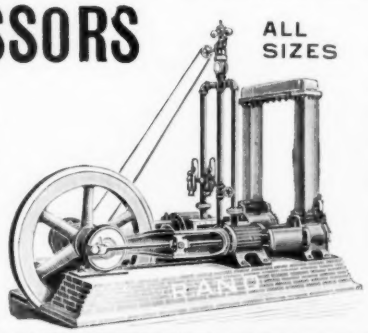
Our **Duplex Compressor,** Compound Air Cylinders, with Inter-Cooler and Compound Steam Cylinders, with Meyer Cut-off Valves, is the best construction for small and medium sizes.

ALL SIZES



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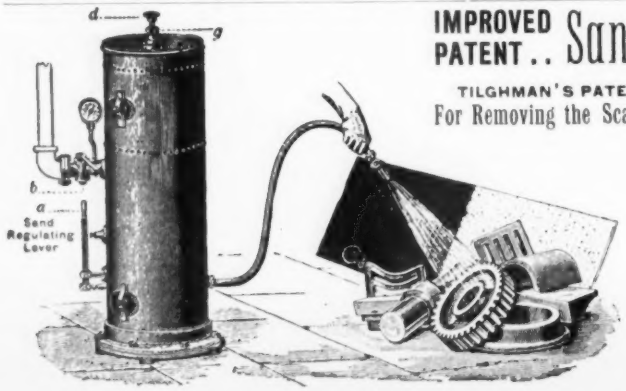
Don't forget our Rock Drills. 100 Broadway, NEW YORK.



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TILGHMAN'S PATENTS. MATHEWSON'S PATENTS.

For Removing the Scale from Iron and Steel Plates.

Cleaning Castings, Forgings, etc

Sole Agents for the West.

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FOR OPERATING

Pneumatic Chipping Hammers, Hoists, Casting Cleaners, Sand Blast Machines, Molding Machines and other appliances in foundry work.

COMPLETE OUTFITS FURNISHED AND INSTALLED.

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The Only Practical Method for . . . . **MAKING CASTINGS**

OF A DESIRED QUALITY

AT A LOW PRICE. ✻

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Detroit, Mich.

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FOUNDRY MOLDING MACHINES,
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PORTABLE, AIR-POWER, MACHINES,

USING WOOD OR METAL SPLIT PATTERNS, WITHOUT STRIPPING PLATES.

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INVENTORS OF THE

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FOR ALL PURPOSES.

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PORTABLE EMERY GRINDER

Take the tool to the work and save heavy handling.

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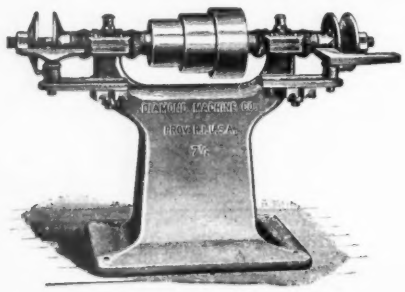
FREE CUTTING AND DURABLE.

We make a Specialty of Weeels for Grinding Castings and will Guarantee Satisfaction.

Catalogue upon Application.

American Emery Wheel Works, **PROVIDENCE, R. I.**



No. 7½ GRINDER.

This Grinder

was designed by us for foundry use. One stove maker has 16 of them. The distance between wheels is 48 inches, diameter of spindle between flanges 1¾ inches or 2 inches, as ordered. Babbitted boxes with three ring oilers. Weight, 1200 lbs. If you want a good substantial grinder write us for circulars and prices.

DIAMOND MACHINE CO. Providence, R. I.

Heyl & Patterson

ENGINEERS AND CONTRACTORS,

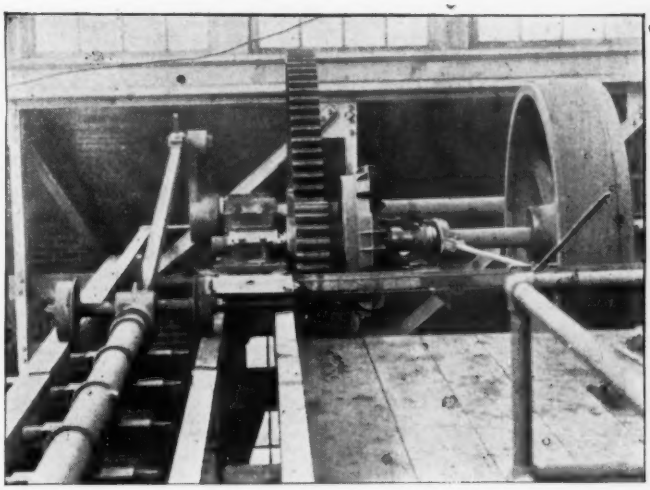
PITTSBURG, PA.

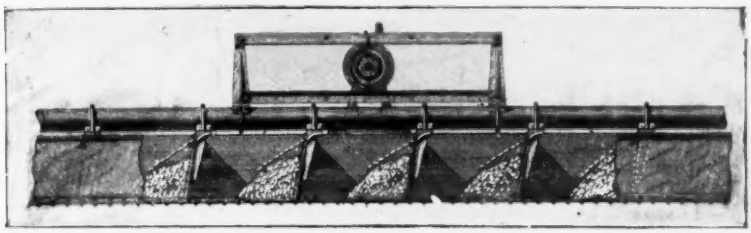
ELEVATING AND CONVEYING MACHINERY.

RECIPROCATING CONVEYORS FOR TRANSPORTING SAND.

FEEDING AND MEASURING DEVICES FOR THE AUTOMATIC TEMPERING OF SAND.

SLOW SPEED, PERFECT DISCHARGE ELEVATORS.

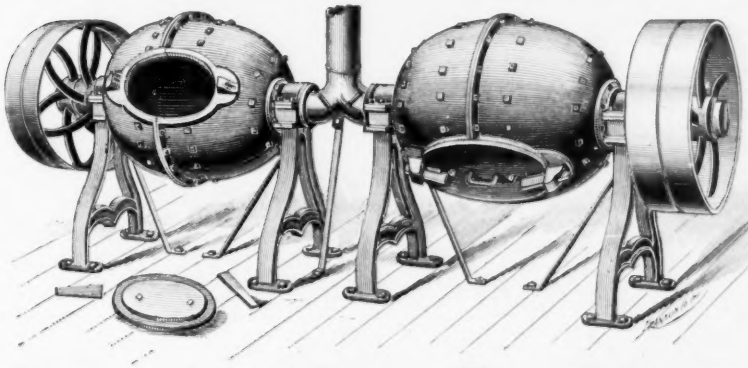




Views of 230-foot Reciprocating Sand Conveyer at Westinghouse Air Brake Co.'s Foundry, . . Wilmerding, Pa.

PATENTS PENDING.

Complete Installations.



A Fine Pair

Stover's IMPROVED EXHAUST Tumbling Barrels

The Stover Egg Shaped Barrel does double the work of any other with less noise and power. It gives the contents a double motion or action—from ends to center and from side to center—causing a thorough mixing and rubbing together of all the parts contained therein, cleaning and polishing the contents better and quicker than any other form of barrel.

Sent on 30 days approval to any responsible manufacturer of light castings, malleable iron wire nails, or any other small articles that require cleaning and polishing.

For full particulars, address,

Stover Manufacturing Co.

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E. A. FORD,

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(PROMPT AND RELIABLE)

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Through Trains with Parlor and Sleeping Cars leave Detroit from foot of Brush Street, landing you direct in **Grand Central Union Station,** Cincinnati. Positively the only line avoiding depot transfers to any point South.

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Have you ever seen the record

Made by blast furnace No. 1, Ensley, Alabama? This furnace ran continuously four (4) years and two (2) days and made 253,533 tons of pig iron.

The greatest record ever made by any furnace in the South.

This furnace was lined exclusively with "FRANKLIN CROWN" and "SLIGO" Fire Brick. The best on earth. This record is equal to double the amount of northern ore.

Garden City Sand Co., * * SECURITY BUILDING, CHICAGO.

Exclusive agents for the Northwest.

DO YOU MAKE LIGHT OR HEAVY

Dry Sand and Skin Dried Work?

IF SO, YOU SHOULD USE

McCORMICK'S

VULCAN BLACKING.

It makes as clear and smooth a casting as the best plumbago and better than the silver leads. Not an experiment—in use in the largest foundries. A trial will satisfy you of its value.

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No. 1 for Use With Centrifugal Blowers.

No. 2 for Use With Compressed Air.

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LARGEST STOVE MANUFACTURERS IN THE WORLD.

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MONARCH BICYCLES

$25	$35	$50

Quality better than ever. Reputation established. Agents everywhere. Send for Catalogue.

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OUR No. 8 F. Cut 8 inch high; 24½ inch long.

Accurate pattern construction made easy.

Buy of the Original Manufacturers.

We make ten sizes. Over 11,000 sold.

See if you have plenty of these tools in your pattern shop. **Remember we offer to send you any size on trial.**

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SO . ARE . PRICES.

Send for catalogue if interested. ¶ Send sample for Prices on Gray Iron Castings. Our **Furnaces**, round steel shell, with drop grate, are up to date.

LATEST and BEST.

BE SURE YOU GET THE RIB. Patent No. 580,205.

We make . . **Clamps, Boards** and **Other Supplies Castings, too.**

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West's Molder's Text Book

461 Pages.
Fully Illustrated.

Price $2.50, Postpaid; with The Foundry, one year, $3 in U. S., Canada and Mexico; other countries, $3.75.

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Presenting the Best Methods and Original Rules for obtaining Good, Sound, Clean Castings and giving detailed descriptions for Making Molds Requiring Skill and Experience; also containing a Practical Treatise upon the Construction of Cranes and Cupolas and the Melting of Iron and Scrap Steel in Iron Foundries.

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... Complete Outfits ...

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STRICTLY FIRST-CLASS TOOLS.

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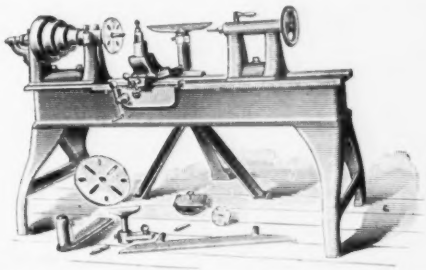

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14-in. and 36-in. Band Saw Machine.

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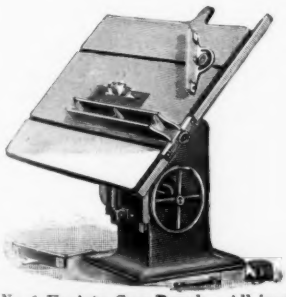
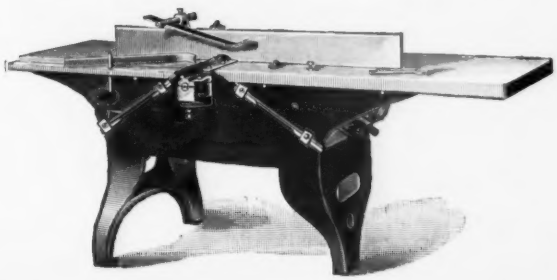


No. 1 Variety Saw Bench. All iron and steel.



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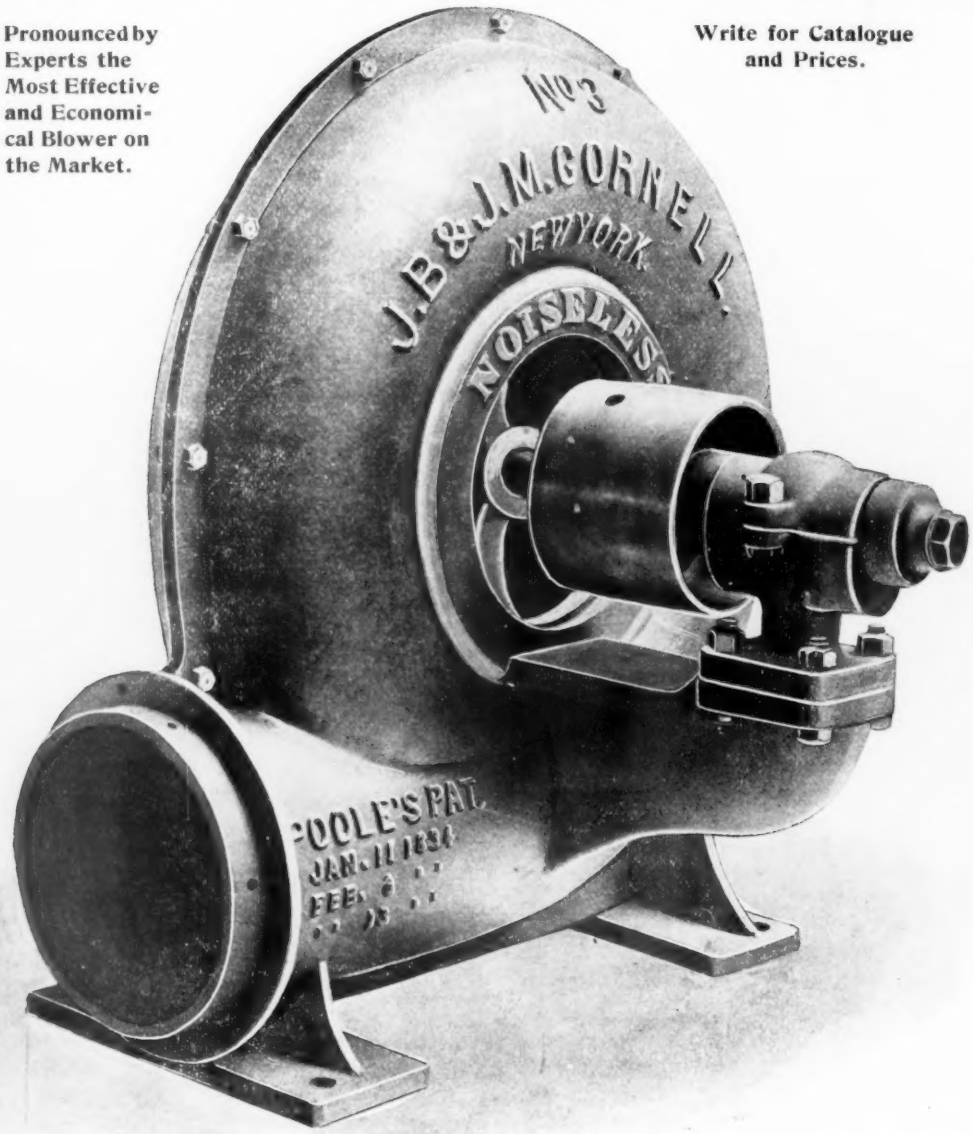
Pronounced by Experts the Most Effective and Economical Blower on the Market.

Write for Catalogue and Prices.



THE LATEST TESTIMONIALS.

MESSRS. J. B. & J. M. CORNELL: NEW YORK, Jan. 28, 1890.

Replying to your favor relative to the blower we purchased of you, we beg to say that we have found it to work satisfactory, and with very much less power than any we have ever used.

JACKSON ARCHITECTURAL IRON WORKS, 315 East 28th Street.

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GENTLEMEN—It gives me pleasure to state that I have given the No. O Blower of your patent sent us, a careful and exhaustive test against a like-sized blower of a Standard make, running both at the same time, from the same shaft, and at exactly the same speed. Your blower gives a slightly higher pressure and fully double the volume of the other. This result was obtained by carefully measuring the area of the discharge openings for the blast from both Blowers and yours would supply an opening of twice the area of the other blower before showing a diminution in the pressure of the blast.

Very truly, JAMES P. WILSON, Supt., TIRRILL'S GAS MACHINE CO., 14 Commercial St., Newark, N. J.

Manufactured and Sold by **J. B. & J. M. CORNELL,** **26th St. and 11th Avenue, NEW YORK CITY.**

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Plumbago, Talc, Sea Coal Facing
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Molders' Tools, Chaplets, Pattern Letters, Pattern Lumber, Crucibles, Coke Forks . . Pattern Fillet. Molasses, Flour, Core Compound, Fire Sand, Snap Flasks, Sand Sifting Machines, Etc., Etc. . . . . .

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CINCINNATI, O., and CHICAGO, ILLS.

CANADIAN AGENTS,

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MONTREAL, QUE. TORONTO, ONT.

Send for General Catalog No. 26.

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All Goods Guaranteed to be of the Best Quality and to Give the Very Best Satisfaction and Results.

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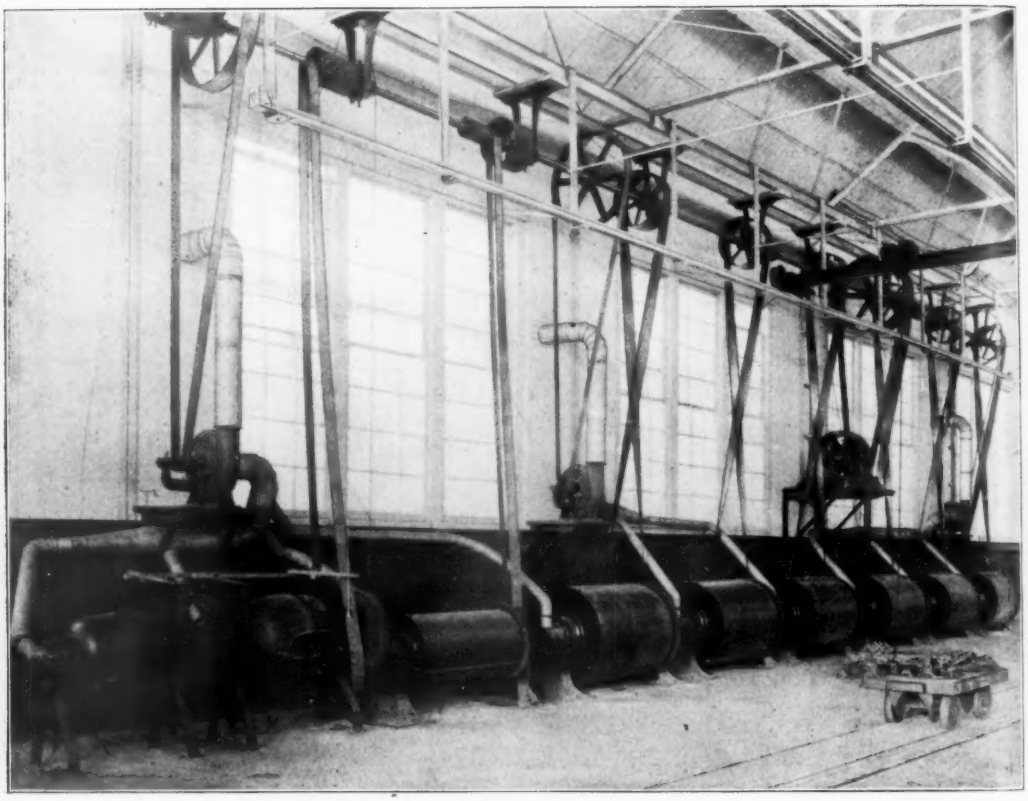
Fire Brick, Cupola Blocks, Fire Clay, Kaolin, Ganister, Silica, Etc.

Paxson Exhaust Rumblers

MADE OF STEEL.



No Cast Iron Staves

BUT

One Solid Sheet of Steel.

Wide Door Extends Full Length of Mill.
Ribs on Inside to Keep Castings from Slipping.

We have lately installed a large gang of them in the works of the General Electric Company, Schenectady, N. Y., where they are run by electric motors. We also supplied them with two egg-shaped Rumblers, as shown in the cut.

These are the best and most economical Rumblers ever made.

J. W. Paxson Co. 1021 North Delaware Avenue, PHILADELPHIA, PA., U. S. A.

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Paxson-Colliau Cupola

The more you examine it, the better you will like it . . . . . .

The Acme of Science in Cupola Construction . .

All that was Best in the old Colliau Cupola, with Every Improvement suggested by long experience added.

LOCATION AND AREA OF TUYERES INSURE THE HIGHEST MELTING . . . EFFICIENCY. . . . . .

It keeps us hustling to fill the orders for these goods.

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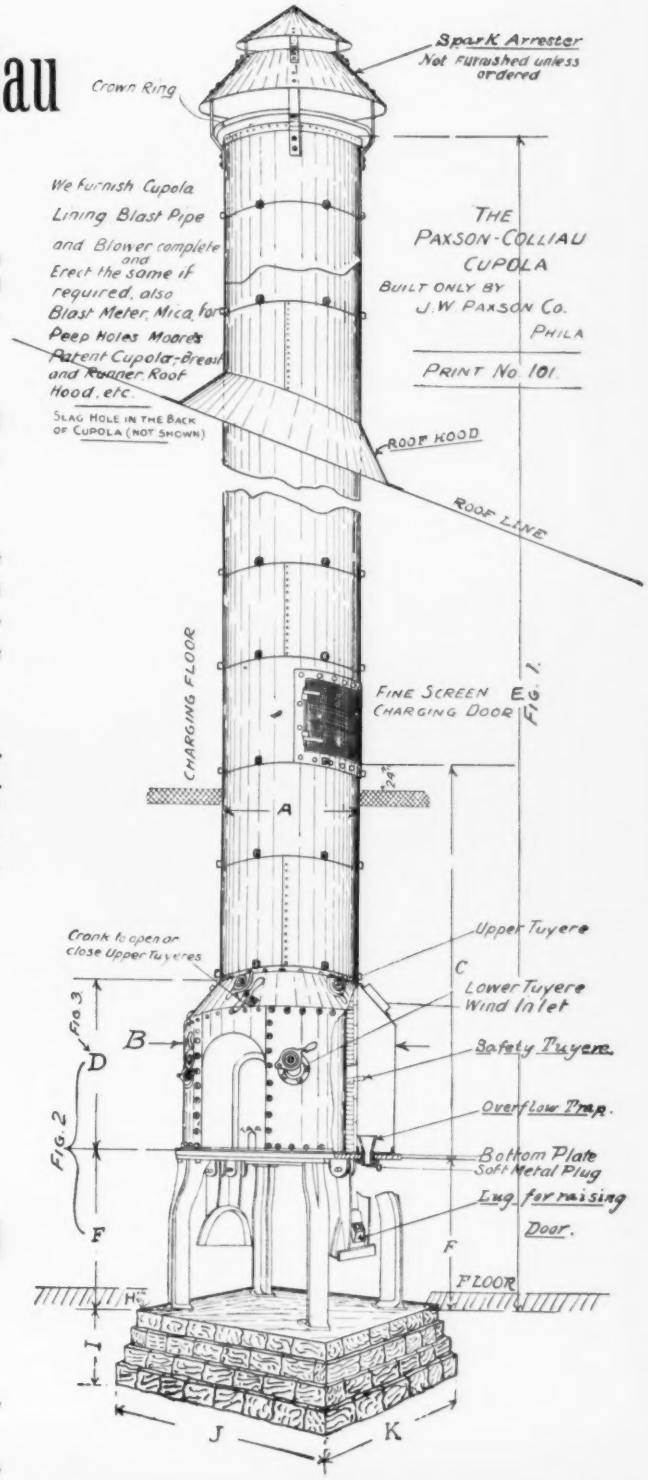

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CRUCIBLES for Brass Melting.
CRUCIBLES for Steel Melting.
CRUCIBLES made specially for the different Metals.

CRUCIBLES for Oil Fires.
CRUCIBLES for Coal Fires.
CRUCIBLES for Coke Fires.
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We recognize the fact that different metals and different fires demand different crucible mixtures for the best results and we are prepared in every way to meet that demand.

Although we are the oldest crucible manufacturers in the world, we are up-to-date in every particular, and the knowledge of our chemists and our skilled workmen is at the service of our customers. If you are not quite satisfied with your crucibles or their work, possibly we can help you. We shall be glad to answer any inquiries.

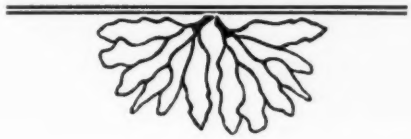
Joseph Dixon Crucible Co.

JERSEY CITY, N. J.

Whitehead Brothers Company,

DEALERS IN

Molding Sand



FIRE SAND,
PHILADELPHIA SAND
FRENCH SAND,
FIRE CLAY, KAOLIN,
FOUNDRY FACINGS
and SUPPLIES
OF ALL KINDS.
LEAD FACINGS
A SPECIALTY.

Albany Sand for Brass and Stove Plate Castings.

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We Guarantee..

That one man with one of our **PNEUMATIC HAMMERS** can do more and better work than four men working in the ordinary way.

These same Hammers are also especially adapted for calking boilers and beading flues.

We also manufacture the best Air Drill on the market, and our Air Hoist and Compressors are especially designed for foundry work.

All tools sent on ten days' trial, subject to approval and are guaranteed for one year.

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WASHINGTON COAL & COKE CO.

CAPITAL, PAID UP, $500,000.

3500 Acres of Coal.

5000 Tons Daily Capacity.

300 30-TON COAL CARS

50 30-TON COKE CARS.

Foundry Coke Our Specialty.

GENERAL OFFICE—
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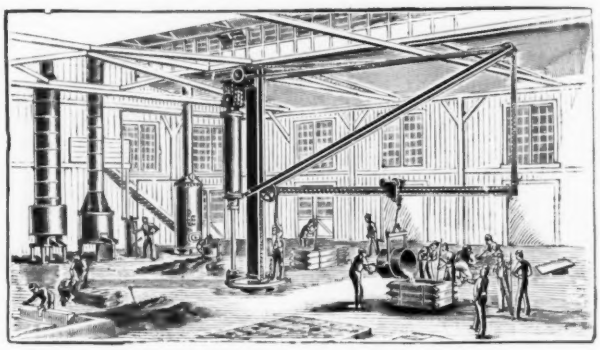
WE HAVE A THEORY

That a crane cannot be too good. A crane is a "stand-from-under" machine. It always works over the heads of men. In a live, going place there is scarcely a minute of the day someone is not under a crane. If a crane fails someone is bound to be hurt.

Yet some men—not you—but some men buy cheap cranes.

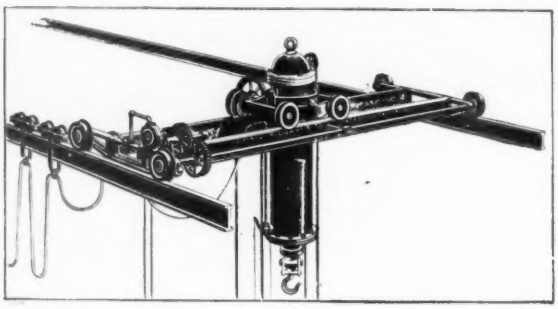
There are lots of cheap cranes to be had and lots are sold, and oh! the long wail that comes into our office from Monday morning until Saturday night: "Ridgway, can you change our cranes to your style?" "Ridgway, can you attach your oil governed hoist to our cranes?" "Ridgway, we wish we had known about your cranes before we got these rattle-traps!" And thus it goes. They wanted cheap cranes and they got 'em.



5-Ton Steam Hydraulic Crane in a Foundry.

It's easy enough to build a crane cheap. We could take a Ridgway Crane and skin it all over from foundation plate to top steadiment and maybe it would not cost very much. But excuse us! Ridgway Cranes are not man-killers. Ridgway Cranes have a name and a reputation for excellence. Because when once erected and put to work that is the end of them, so far as cost is concerned; they are in consequence the cheapest of cranes. No repairs, no breakdowns and delays, no hurt men, no damage suits. We put the stuff into Ridgway Cranes, the best stuff too, and lots of it.

HYDRAULIC AIR HOISTS.



Which they are not at all, work by air direct, same as any other air hoist. We put some oil in the hollow piston rod and that makes the machine an hydraulic. We cannot tell all about them in an advertisement like this. We have circulars for the mere asking. No drummer attachment to the circular either.

The best way is for you to get **Just One** and try it for yourself. The machine at work for you will tell the whole story.

"PLEASE TAKE THE ELEVATOR"

Let the Steam Pipe Lift Your Stuff for You.

CRAIG RIDGWAY & SON, COATESVILLE, PA.

EUROPEAN AGENT,

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PHILADELPHIA.

MODERN FOUNDRY MACHINERY

SAND MIXER.

Not an Experiment

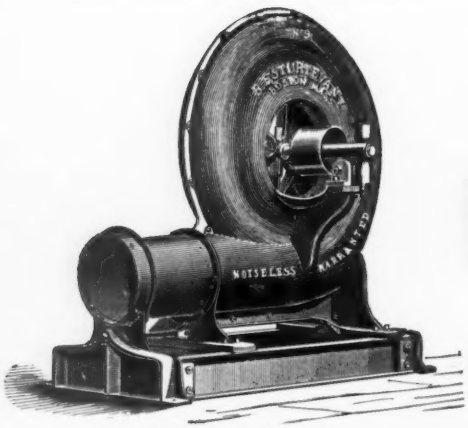
PRACTICAL.

ECONOMICAL.

EXPEDITIOUS.

NOTE. — The old-fashioned method of sifting sand has been to a large degree superseded in modern foundries by the Superior Centrifugal Method, and the machine illustrated herewith is a real labor saver.

Correspondence Is Solicited.



Blower on Adjustable Bed.

THE STURTEVANT STEEL Pressure Blowers,

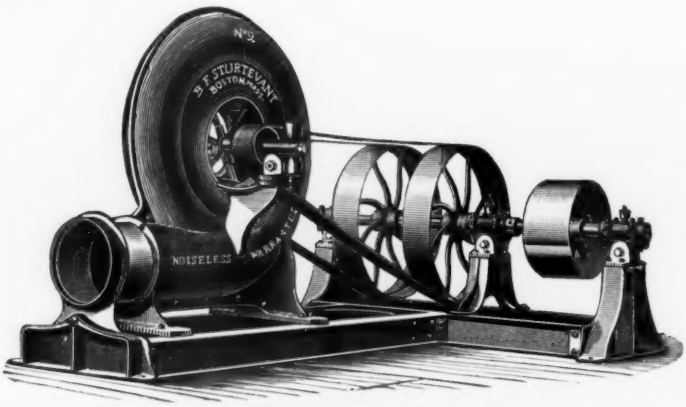
—FOR—

Cupola Furnaces and Forge Fires.

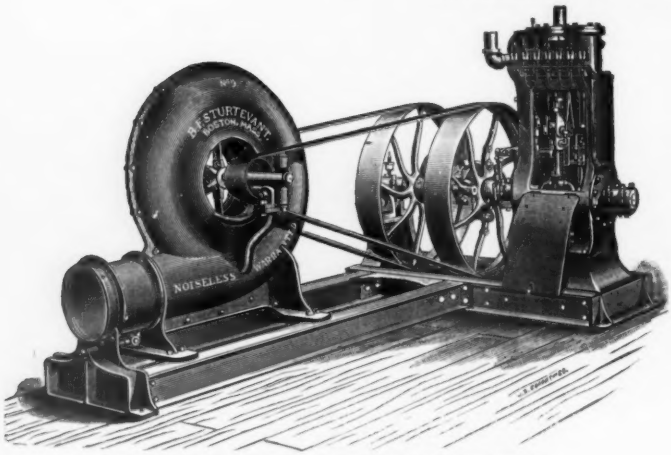
BLOWERS

Furnished without Bed with Separate Countershaft

BLAST GATES



Blower on Adjustable Bed with Combined Countershaft.



Blower on Adjustable Bed with Double Enclosed Engine.

BLOWERS

WITH

THE STURTEVANT

Direct Connected

Electric Motors

Send for Catalogue.

B. F. STURTEVANT CO.,

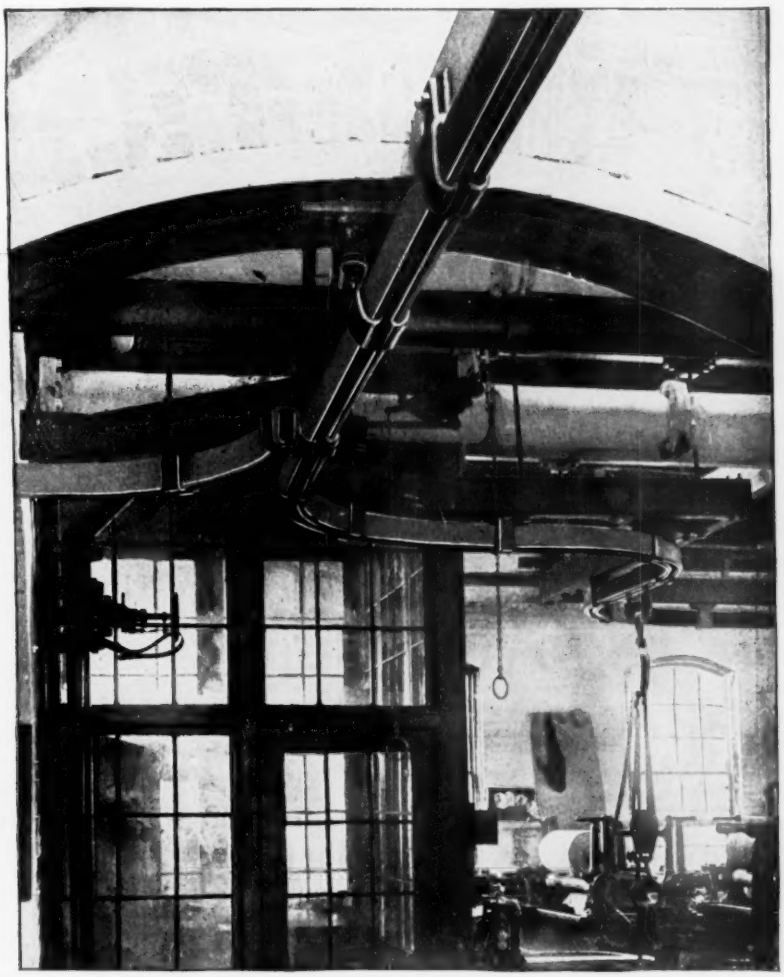
BOSTON MASS.

131 Liberty Street, NEW YORK. 135 N. Third St., PHILADELPHIA.
16 S. Canal St., CHICAGO. 75 Queen Victoria St., LONDON.

STOCK CARRIED AT BRANCHES.

OVERHEAD TROLLEY TRACK.

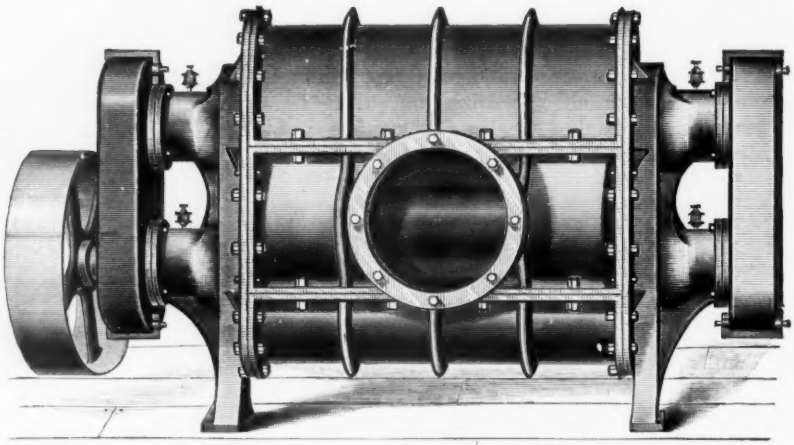
The Overhead Trolley Track occupies no room that can be otherwise employed. It is never obstructed and can be easily used at all times for transportation of materials, machinery or articles of any kind. Its great advantage in most foundries, however, arises from the economy resulting from its use as an aid in getting iron quickly from cupola to floors with a small fraction of the labor usually employed. Our Catalogue (sent free an application) illustrates in detail the construction of parts.



We have foundry customers who are handling 25 to 40 tons of hot metal per day on our Patent Trolley Track Tramway System. It pays for itself in a short time. You cannot afford to be without it. Send detailed sketch or blue print of your requirements. We will reply promptly. We can do you a good turn.

Coburn Trolley Track Mfg. Co. HOLYOKE, MASS.

The Green Rotary Pressure Blower



Working parts are two perfectly balanced impellers, mounted on the best steel shafts, running in bronze bushes, detachable journal bearings, cut gearing at both ends of the Blower enclosed in oil-tight casing.

Weighs less, occupies less space, costs less for freight than any other POSITIVE BLOWER in existance.

FOUNDRY BLOWERS

High Pressure Blowers

GAS EXHAUSTERS

Exhausters for Hot Gases

The GREEN Gives the Most Value for a $.

Wilbraham Baker Blower Co

2518 Frankford Ave. PHILADELPHIA, PA.

Sales Agents: **Frazer & Chalmers, Inc.** CHICAGO, ILL., and BRANCH HOUSES.

Over
12,000
in Use.

ALWAYS READY!

800 TO 2000 CANDLE POWER.

ESPECIALLY ADAPTED FOR

FOUNDRIES

PORTABLE, SELF-CONTAINED, AUTOMATIC.

NO SMOKE! NO SPRAY! NO SHARP SHADOWS!

Now in Valuable Use With Hundreds of Foundries,

In addition to 400 Railroads and over 500 Contractors.

ROSS-MEEHAN FOUNDRY CO.
CHATTANOOGA, TENN., May 5, 1896.

The Wells Light M'f'g. Co., Nos. 44 and 46 Washington St., New York City:

GENTLEMEN—It is contrary to our rule to give testimonials, but an article with the merit of your Wells Light deserves to be made an exception. We have used your lights for the past five years, and consider them indispensable to us.

Yours very truly,
ROSS-MEEHAN FOUNDRY CO.
P. A. BRAWNER, JR., Sec'y. & Treas.

REQUEST CIRCULARS FROM

THE WELLS LIGHT M'F'G. CO.,

EDWARD ROBINSON, Sole Proprietor.

44-46 WASHINGTON STREET, NEW YORK.

Coreine is a Wonder!

YOU DON'T NEED ROSIN.
YOU DON'T NEED FLOUR.
YOU DON'T NEED OIL.
YOU DON'T NEED MOLASSES.
YOU DON'T NEED ANYTHING

BUT

COREINE

to dampen the Core Sand with, to make the **Strongest, Best-Vented,** Longest Lasting Cores without **Smoke or Odor.**

A Core made with **Coreine will not Blow** or **Swell.**

It will rap out easily.

A most satisfactory Core Mixture for the most intricate Core Work.

PRICE LIST "COREINE."

By the Barrel,	-	25c per gal.	5 Gal. Cans,	-	40c per gal.
10 Gal. Cans,	-	30c per gal.	1 Qt. Cans,	-	25c each.

INCLUDING PACKAGES, ALL F O. B. CARS CINCINNATI.

Manufacturers and Sole Agents for Coreine Co.,

The J. D. Smith Foundry Supply Company,

CINCINNATI, OHIO, U. S. A.

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McCULLOUGH-DALZELL COMPANY

PITTSBURG, PA.

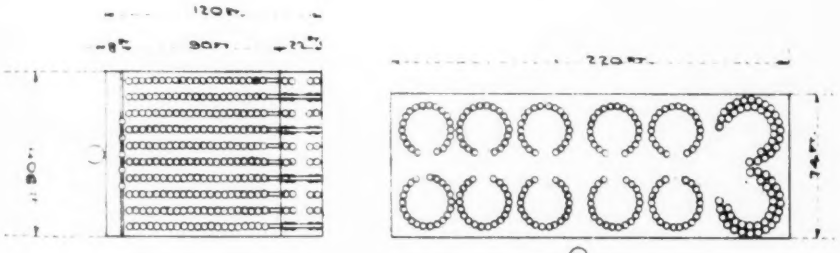
CAST IRON CHILLED CAR WHEELS

PRONOUNCED SUPERIOR TO STEEL TIRED WHEELS.
IN UNIVERSAL USE ON ALL RAILROADS IN U. S.

Manufactured Most Economically With

THE WHITING SYSTEM

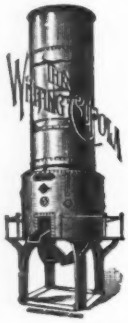
Under the Old Method 50 per cent. more space is required than with the Whiting.



THESE PLANS ARE DRAWN TO SAME SCALE.

A Ten-Floor Plant of THE WHITING SYSTEM; average daily capacity, 210 wheels. Molding and pitting area, 10,800 square feet.

A Ten-Floor Plant of any JIB CRANE SYSTEM, HAND, HYDRAULIC or BELT POWER; average daily capacity, 200 wheels. Molding and pitting area, 16,250 square feet.



Send for estimates and prints, giving capacity per day, size of shop, etc. We design and manufacture complete plants for Car Wheel, Pipe and General Foundries at home or abroad, MALLEABLE AND OPEN HEARTH STEEL PLANTS.

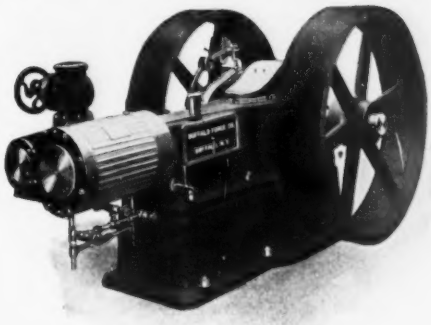
Electric and Hand Power Travelers, Air Hoists, Receivers, Etc.

CUPOLAS LADLES, TUMBLERS AND . . ALL FOUNDRY EQUIPMENTS.

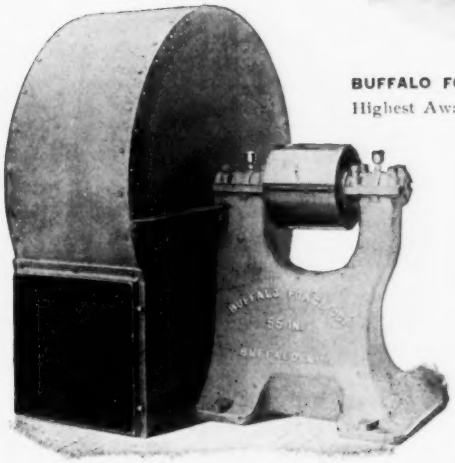
ENGINEERS AND DESIGNERS OF FOUNDRIES.

Whiting Foundry Equipment Co.

GENERAL OFFICE AND WORKS: HARVEY, ILL., U.S.A. (CHICAGO SUBURB.)
CHICAGO OFFICE: 1543 MARQUETTE BUILDING.



BUFFALO FORGE CO., AUTOMATIC ENGINE.
Highest Award and Gold Medal at Omaha, 1898.



BUFFALO TUMBLING BARREL EXHAUSTER.

Tumbling Barrel Exhausters are easily applied, thoroughly efficient, and change casting cleaning rooms from a death-dealing pestilence to a comfortable working apartment.

Send for details.

Our 400 Page Calalogues tell all about these machines, applications, etc.; also Fan System of Heating Foundries, etc.

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Buffalo Forge Company,

BUFFALO, N. Y.

BUFFALO CUPOLA BLOWER.

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demands that a Journal should treat every advertiser alike . .

THE FOUNDRY **has but one rate. No reduction to Advertising Agencies . . . . . .**

Full Page, - per month,	$25.00
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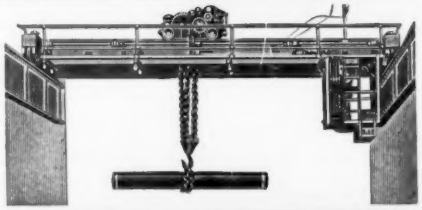
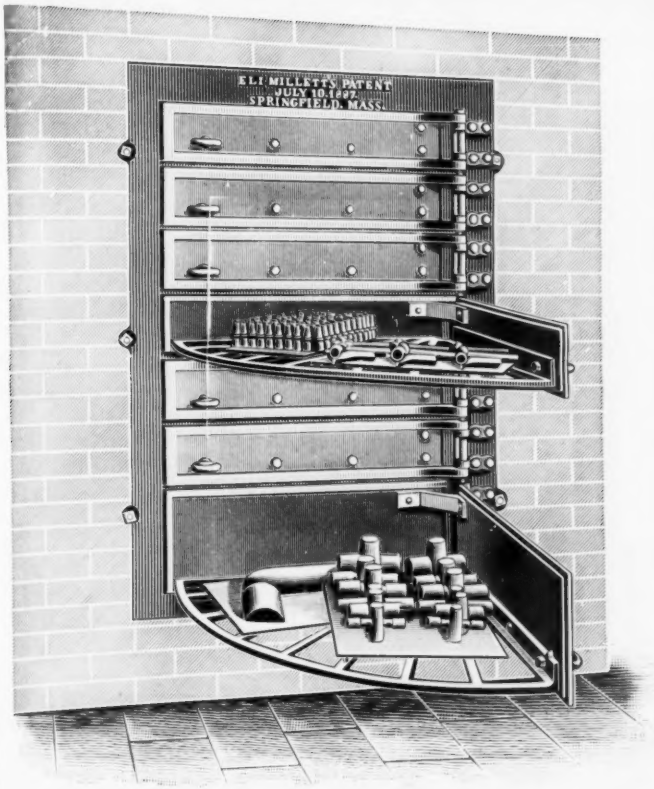


ELECTRICAL STEAM BELT AND HAND POWER

THE CASE MFG CO

COLUMBUS, OHIO.



Millett's Patent Core Oven

Double Doors,
One closing the oven when the other is open.

THE BEST IN THE WORLD

No Foundry using small cores can afford to be without it.

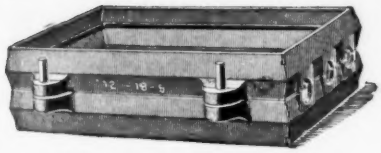
Over two hundred in use.

Send for our new Catalogue giving names of those using them.

Millett Core Oven Co.

BRIGHTWOOD, MASS.

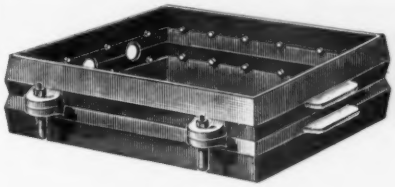
These Ovens can be seen in the show rooms of the S. OBERMAYER CO., Chicago or Cincinnati, or the J. W. PAXSON CO., Philadelphia, Pa.



HORIZONTAL LIGHT RIBBED.

State Size. Ask for Price.

Ribs in Beveled Flasks add to the weight and obstruct ramming—do you want them? You are the Doctor!



PORCUPINE.
(PAT. APPLIED FOR.) Made in 1898.

Estate of Oscar Barnett.

LONG DISTANCE PHONE 1045.
ESTABLISHED 1845.

NEWARK, N. J., U. S. A.

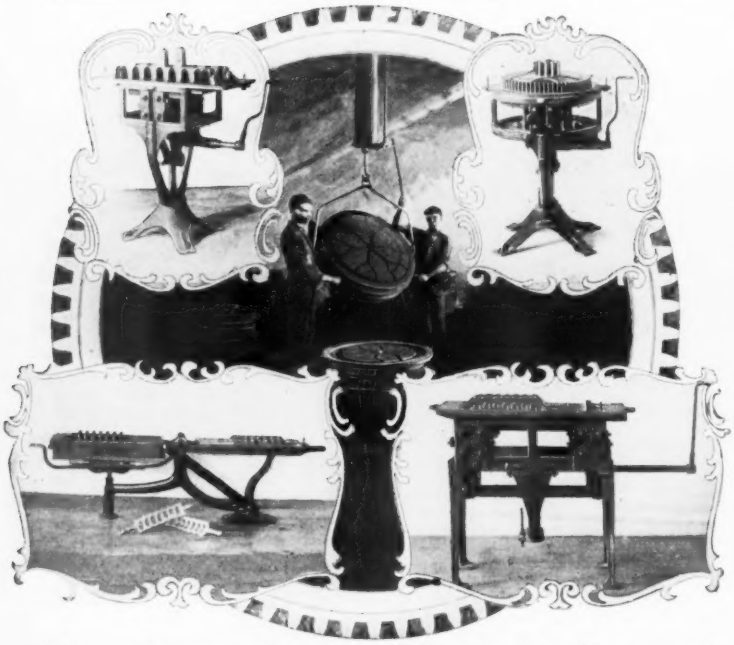
These Flasks are not milled with emery wheels and thrown together, but interchange and are perfectly fitted.

Makers of Everything for a Brass Foundry

PERPENDICULAR RIBBED.
DEMEREST'S PATENT, 1855.

OSCAR BARNETT'S OLD RELIABLE
(Standard Beveled Style.)
IT LEADS.
NOT RIBBED.
Our own foundry insures prompt shipment. Faces planed level; don't rock.

STRAIGHT SIDE, BEAD AT TOP, BOTTOM AND PARTING.



Rights to use these machines for molding malleable iron or steel castings are reserved.

In this Illustration

are shown a few examples of special molding machines built . . for special purposes. No ready made molding machines can . . . compete with them. If you have work for a machine, have one built that will fill the bill. When you get a **"Pridmore"** you get a special machine, and not some stock affair, calculated to mold . . everything and molding nothing.

HENRY E. PRIDMORE, 111-113 W. HARRISON ST., CHICAGO

FOR SALE! ✳ THE SOMERSWORTH MACHINE COMPANY.

The extensive plant and business of The Somersworth Machine Co., located at Dover and Salmon Falls, N. H., is offered for sale.

The Dover plant is located sixty-eight (68) miles from Boston and forty-eight (48) miles from Portland, and consists of 19 buildings and 9 acres of land, situated alongside the tracks of the Boston & Maine R. R., from which a spur track runs to the loading and unloading points of the shops. The shops have a first class power plant of 80 H. P., and the electric light, heating and sprinkling systems are complete.

The Foundry has two (2) large cupolas, one 48 inches in diameter and the other 60 inches in diameter. It is built of brick, 200 by 50 ft., with monitor roof 33 ft. high. The core room is 40x40 ft. and the core sand room is 30x20 ft.

The machine shop is of brick, one story, with the monitor roof 26 ft. high, and is 270x70 ft., and is well equipped with machine tools and machinery for a job shop

The John A. White Co. Machine Shop is of brick, one story, with monitor roof 25 feet high and 160x70 ft. In this department there has been manufactured wood working tools and machinery well known to the trade.

The Stove Works at Salmon Falls are situated on the Western and Northern divisions of the Boston & Maine R. R. and are 74 miles from Boston and 43 miles from Portland. The plant has been in operation since 1848, manufacturing heating and cooking stoves, furnaces, sinks, hollowware and all castings pertaining to the trade, and has put upon the market over 60 different patterns of stoves and there are 100,000 in use in New England to-day.

The plant consists of 22 buildings, 40 acres of land and 8 tenement houses, containing 14 tenements. Has an electric light system and a nickel-plating plant installed last year. The property is in excellent condition and has a well established and profitable business.

The above described plant of the Somersworth Machine Co., including the stock, patterns, machine tools and good will, will be sold as a whole or divided up as may seem desirable. For full particulars and descriptive list of the Real Estate, Machine Tools and Machinery, and the manufactured product of the business, address the undersigned,

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DOVER, N. H.

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"While you Sleep"

UNPARALLELED NIGHT SERVICE. NEW STEAMERS

"CITY OF BUFFALO"
AND
"CITY OF ERIE,"

both together being without doubt, in all respects, the finest and fastest that are run in the interest of the traveling public in the United States.

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Leave Cleveland 8 P.M. Arrive Buffalo 6 A.M.
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Connections made at Buffalo with trains for all Eastern and Canadian points. Ask ticket agent for tickets via C. & B. Line. Send four cents for illustrated pamphlet. SPECIAL LOW RATES TO BUFFALO AND NIAGARA FALLS EVERY SATURDAY NIGHT.

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$25	$35	$50

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CAPITAL AND SURPLUS, $1,000,000

CHICAGO. NEW YORK. LONDON.

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E. O. McCORMICK, Pass. Traffic Manager, CINCINNATI. H. J. RHEIN, General Agent, DETROIT.

THE KING IMPROVED SAND BLAST.

No. 1

For Cleaning Light and Ornamental Castings, particularly those to be Enameled, Japanned, Nickeled or ..... Bronzed.

Lowest Priced Sand Blast on The Market.

No. 2.

For Cleaning Large or Heavy Castings, Rolls, Gears, Bath Tubs, and for removing paint or rust preparatory to repainting.

ADDRESS THE KING IMPROVED SAND BLAST CO., STATION C, DETROIT, MICH.

YOUR IRON CONTRACTS

In making your contracts for 1899 for Lake Superior Charcoal Pig Iron, it would do no harm to take up the question of

"PIONEER,"
"ANTRIM,"
"ELK RAPIDS."

These three brands have given satisfaction in car and malleable work for years in the past and will continue to do so for years to come.

Superior Charcoal Iron Co

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GLUTROSE CORE COMPOUND

Used in the Penna. R. R. foundries and other first-class foundries throughout the United States and Europe.

NO BLOWN CASTINGS.

Makes first-class Radiator Cores without Rods.

Send for Samples and Testimonials.

AMERICAN GLUTROSE WORKS

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PHILADELPHIA.

FOX UNIVERSAL TRIMMERS

OUR No. 8 F. Cut 8 inch high; 24½ inch long.

Accurate pattern construction made easy.

Buy of the Original Manufacturers.

We make ten sizes. Over 11,000 sold. See if you have plenty of these tools in your pattern shop. **Remember we offer to send you any size on trial.**

PRICES REDUCED; write for them.

New illustrated catalogue just out.

THE FOX MACHINE CO.,

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Eberhardt's Patented Sprue or Gate Cutter

Dear Sir:—The machine fills the bill; am just delighted with it.
Yours truly,
Maryland Brass & Metal Works,
Baltimore, Md.

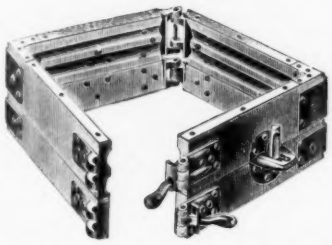
Price Low

THE MARSHALL & HUSCHART MACHY. CO.,
Chicago and Cleveland
Selling Agents.

Send to

GOULD & EBERHARDT, NEWARK, N. J.

EUREKA Improved SNAP FLASK.



A Snap Flask that is always reliable. Heavily bound on both edges with band iron—strong, durable. We sell the "Eureka" cheaper than foundrymen can make any flask for, much less such a flask as this. Write for discounts.

No. 1—Hardwood, 1¼ inch stock, each $2.75.
No. 2—Whitewood, 1¼ inch stock, " $2.50.

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(PROMPT AND RELIABLE)
CLEVELAND, OHIO

Clinton Iron & Steel Co.

"FAIR DEALING" Their Motto.

MANUFACTURERS OF

"CLINTON" AND "HECTOR"

INSPECTED FOUNDRY IRONS . . . . .

ALSO
Sole Factors for DUNBAR STRONG IRON

In New York and New England.

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Why deal with Commission people or Agents who give fancy names to Irons and know nothing about their manufacture

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AND ALL FIRE MATERIAL REQUIRED FOR FOUNDRY PURPOSES.

Send for Illustrated Catalogue and Prices.

88 Van Dyke Street, BROOKLYN, N. Y. CITY.

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THE ADAMS COMPANY, DUBUQUE, IOWA

B. F. S. CO.'S **FLASKS**

ARE ALL RIGHT.

SO . ARE . PRICES.

Send for catalogue if interested. ∴ Send sample for Prices on Gray Iron Castings Our **Furnaces**, round steel shell, with drop grate, are up-to date.

HAVE YOU SEEN IT IMITATED?

WHY IS IT DONE?

Patent No. 580,205.

We make . . **Clamps, Boards** and **Other Supplies Castings, too.**

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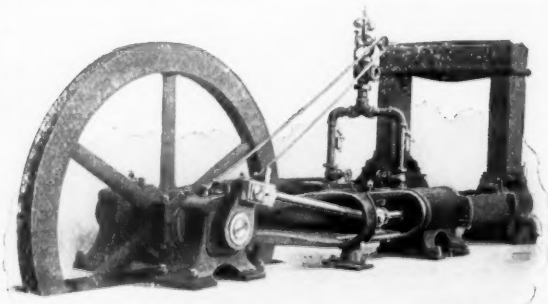
For FOUNDRIES.

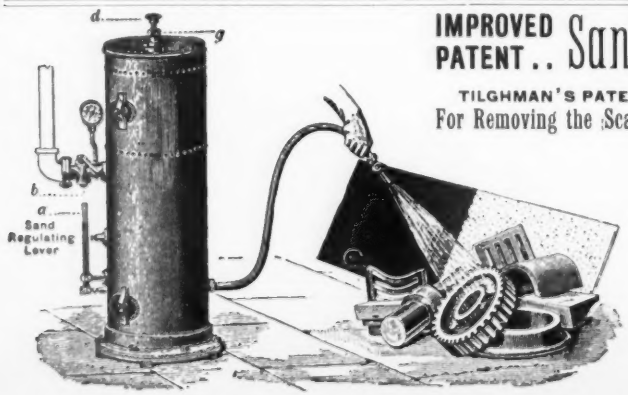
Simple and Multiple Stage. Belt or Rope Driven. All Sizes. Special Patterns.

ROCK DRILLS.

RAND DRILL CO.

100 BROADWAY, NEW YORK.





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TILGHMAN'S PATENTS. MATHEWSON'S PATENTS.

For Removing the Scale from Iron and Steel Plates.

Cleaning Castings, Forgings, etc

Sole Agents for the West.

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23-25 Purchase St., BOSTON.

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Tompkin's Smooth On Castings

A dry Compound that, mixed with water, becomes Iron; . . repairs Defects in Iron Castings; will Stop Leaks of Steam, Water or Gas. Send for Circular.

Smooth On Mfg. Co.

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FOR OPERATING

Pneumatic Chipping Hammers, Hoists, Casting Cleaners, Sand Blast Machines, Molding Machines and other appliances in foundry work.

COMPLETE OUTFITS FURNISHED AND INSTALLED.

For Circulars, Full Information and Prices, address . .

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Havemeyer Building, 26 Cortlandt Street, NEW YORK.

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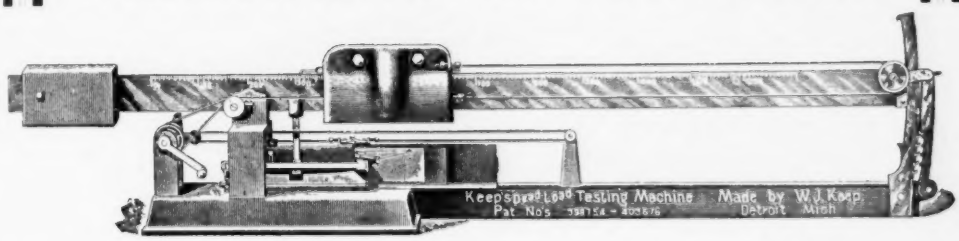

The Only Practical Method for . . . . MAKING CASTINGS

OF A DESIRED QUALITY

AT A LOW PRICE.

Send for Testimonials and for Description of

W. J. KEEP, Detroit, Mich.

KEEP'S TEST APPARATUS.

FOUNDRY MOLDING MACHINES,
STRIPPING PLATE MACHINES,
PORTABLE, AIR-POWER, MACHINES,

USING WOOD OR METAL SPLIT PATTERNS, WITHOUT STRIPPING PLATES.

Write for information.

The Tabor M'f'g Co.,

ELIZABETH, N. J.

ESTABLISHED 1878.

STOW MANUF'G CO.,

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INVENTORS OF THE

FLEXIBLE SHAFT

FOR ALL PURPOSES.

The oldest and largest manufacturers in the world

PORTABLE EMERY GRINDER

Take the tool to the work and save heavy handling.

WRITE US FOR CATALOGUE AND PRICES

EMERY WHEELS

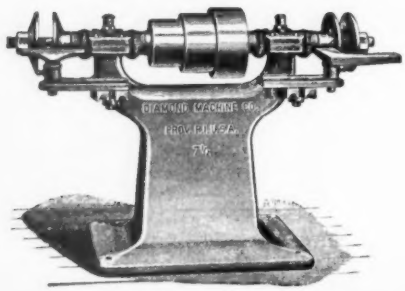
FOR FOUNDRY USE MUST BE

FREE CUTTING AND DURABLE.

We make a Specialty of Weeels for Grinding Castings and will Guarantee Satisfaction.

Catalogue upon Application.

American Emery Wheel Works, **PROVIDENCE, R. I.**



No. 7½ GRINDER.

This Grinder

was designed by us for foundry use. One stove maker has 16 of them. The distance between wheels is 48 inches, diameter of spindle between flanges 1¾ inches or 2 inches, as ordered. Babbitted boxes with three ring oilers. Weight, 1200 lbs. If you want a good substantial grinder write us for circulars and prices.

DIAMOND MACHINE CO. Providence, R. I.

Heyl & Patterson

ENGINEERS AND CONTRACTORS,

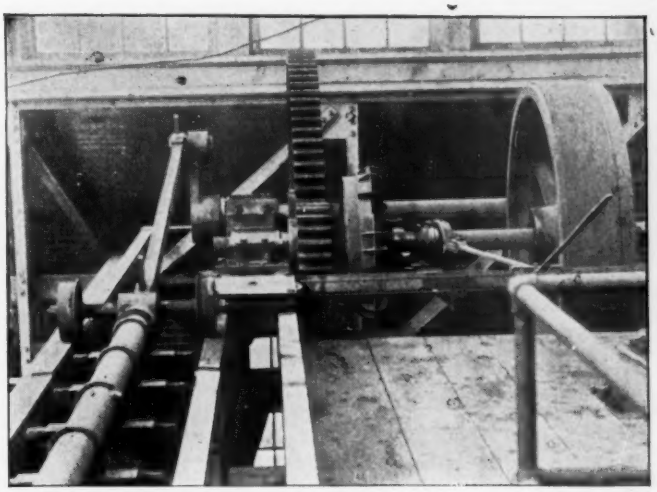
PITTSBURG, PA.

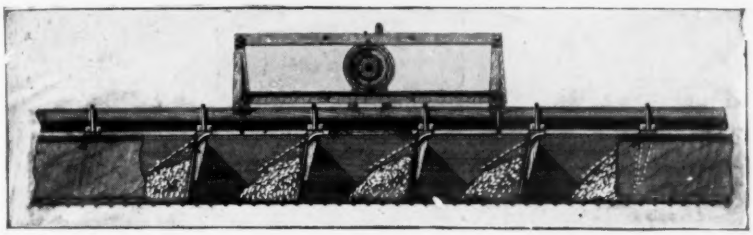
ELEVATING AND CONVEYING MACHINERY.

RECIPROCATING CONVEYORS FOR TRANSPORTING SAND.

FEEDING AND MEASURING DEVICES FOR THE AUTOMATIC TEMPERING OF SAND.

SLOW SPEED, PERFECT DISCHARGE ELEVATORS.

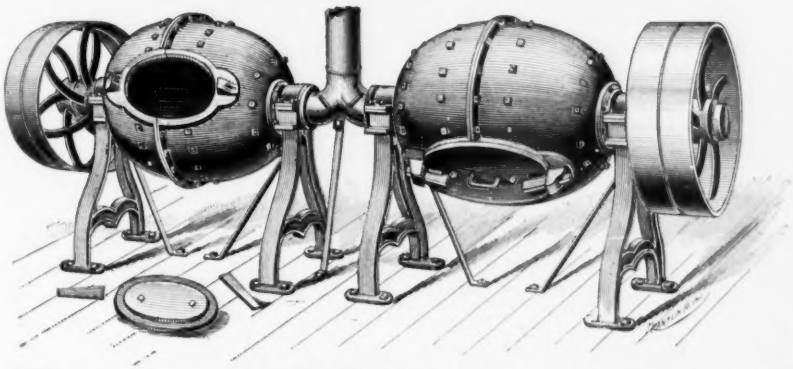




Views of 230-foot Reciprocating Sand Conveyer at Westinghouse Air Brake Co.'s Foundry, . . Wilmerding, Pa.

PATENTS PENDING.

Complete Installations.



A Fine Pair

Stover's IMPROVED EXHAUST Tumbling Barrels

The Stover Egg Shaped Barrel does double the work of any other with less noise and power. It gives the contents a double motion or action—from ends to center and from side to center—causing a thorough mixing and rubbing together of all the parts contained therein, cleaning and polishing the contents better and quicker than any other form of barrel.

Sent on 30 days approval to any responsible manufacturer of light castings, malleable iron wire nails, or any other small articles that require cleaning and polishing.

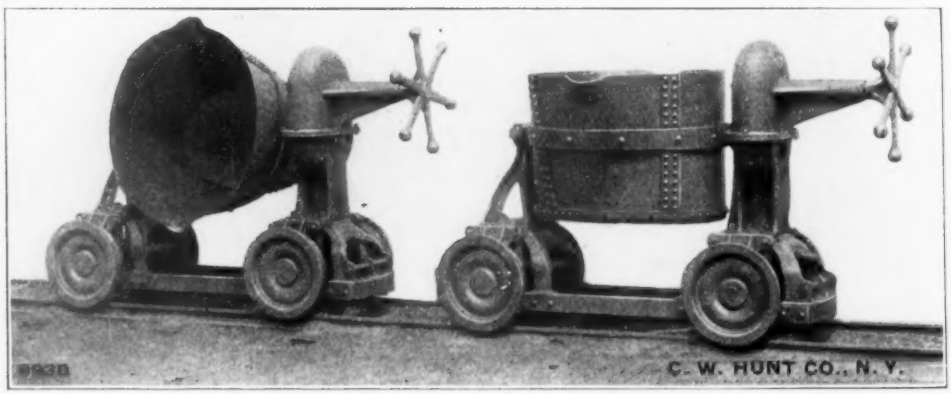
For full particulars, address,

Stover Manufacturing Co.

205 RIVER STREET, FREEPORT, ILL

E. A. FORD,

GEN. PASS. AND TICKET AGENT, PITTSBURG, PA.



Ladle Cars, 1,500, 2,000, 3,000 Pounds Capacity.

Many foundrymen believe that these cars are not only more convenient to use in distributing molten metal, but are also safer than any overhead system of cranes or tackles. No accident has ever occurred in the use of these cars. The height of the top of the ladle above the rails, when upright, is 26 inches; for convenience in pouring into hand ladles, the shape of the body and the position of the trunnions are arranged so that the spout, when tipped, pours into a ladle 17 inches high. The gear for revolving the ladle, is our patent cam gear, that locks the ladle in every position, and possesses the remarkable feature of having both shafts revolve in the same direction. When the handles are moved, the ladle moves steadily in the same direction as the handles, but only one twelfth as fast.

Our system of narrow-gauge tracks, switches, curves, turntables, etc., for use in manufacturing establishments and to accommodate such special cars as the above, is worthy of careful investigation by those who are apt to be interested. Catalogue No. 9204 contains useful data, besides thoroughly treating this subject. Copies will be mailed to those interested. Please address the works direct.

C. W. Hunt Company, Brad Street, WEST NEW BRIGHTON, N. Y.

Have you ever seen the record

Made by blast furnace No. 1, Ensley, Alabama? This furnace ran continuously four (4) years and two (2) days and made 253,533 tons of pig iron.

The greatest record ever made by any furnace in the South.

This furnace was lined exclusively with "FRANKLIN CROWN" and "SLIGO" Fire Brick. The best on earth. This record is equal to double the amount of northern ore.

Garden City Sand Co., ✻ ✻ SECURITY BUILDING, CHICAGO.

Exclusive agents for the Northwest.

DO YOU MAKE LIGHT OR HEAVY

Dry Sand and Skin Dried Work?

IF SO, YOU SHOULD USE

McCORMICK'S

VULCAN BLACKING.

It makes as clear and smooth a casting as the best plumbago and better than the silver leads. Not an experiment—in use in the largest foundries. A trial will satisfy you of its value.

MADE ONLY BY

J. S. McCORMICK CO., PITTSBURG, PA.

DIRECTORY OF LEADING PIG IRON DEALERS.

MATTHEW ADDY & CO.

CINCINNATI, ST. LOUIS.

Agencies,

Chicago, Detroit, New York,

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DAYTON COAL & IRON CO.

(Limited)

PIG IRON,

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702 Fisher Building,
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PITTSBURG, CLEVELAND.

STEVENSON, FIELD & CO.

PIG IRON and COKE,

Columbus, O. St. Louis, Mo.

Molding Sand

AND

Fire Clay.

BEST Quality of ALBANY Fine and Medium Sand; Stove Plate Quality a Specialty.

Our COXSACKIE

Medium and Coarse Sand, is the Peer of Any; there is none better on this earth.

Don't think that because we haven't sold you any sand, that you won't get just what you want; we have our reputation to make, and if carefully selected, loaded and shipped sand is what you want, you'll get it. The quality is ALL RIGHT.

Now About FIRE CLAY.

You have never tried the ALBANY FIRE CLAY? That is not strange, as it was not discovered till last year. Rathbone, Sard & Co. (you know them), say "There's none better." The fact is, there's none so good. It will not draw slag, and cleans ladles easily. It is unquestionably the best Fire Clay in existence to-day. Analysis furnished on application. Reasonable prices and prompt shipment.

L. MURRAY & CO.,

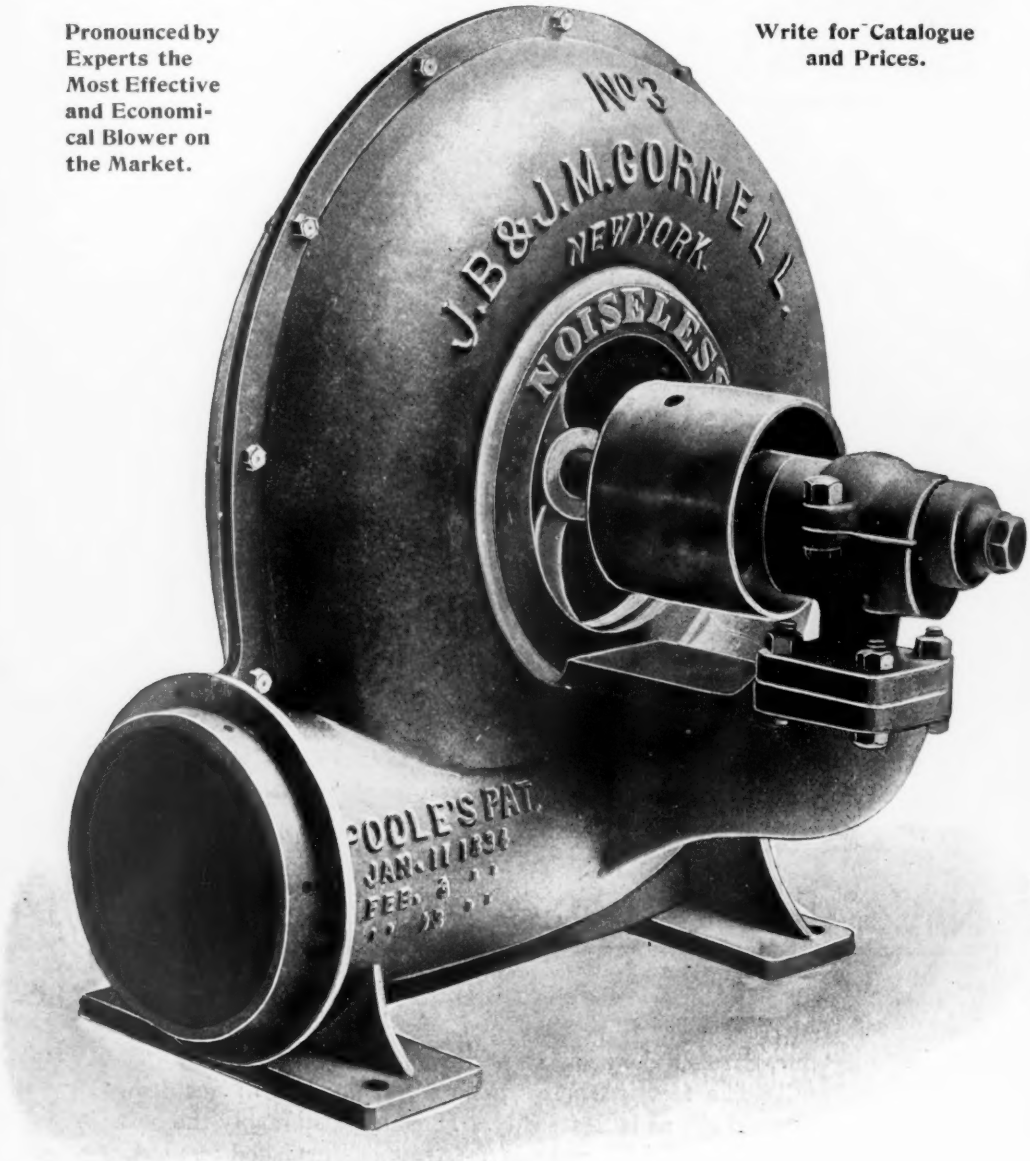
Shipments Made by Rail or Water, at Your Convenience.

135 No. Pearl St., ALBANY, N. Y.

THE POOLE PRESSURE BLOWER

Pronounced by Experts the Most Effective and Economical Blower on the Market.

Write for Catalogue and Prices.



THE LATEST TESTIMONIALS.

MESSRS. J. B. & J. M. CORNELL: NEW YORK, Jan. 28, 1899.

Replying to your favor relative to the blower we purchased of you, we beg to say that we have found it to work satisfactory, and with very much less power than any we have ever used.

JACKSON ARCHITECTURAL IRON WORKS, 315 East 28th Street.

MESSRS J. B. & J. M. CORNELL: NEWARK, N. J., January 24, 1899.

GENTLEMEN—It gives me pleasure to state that I have given the No. O Blower of your patent sent us, a careful and exhaustive test against a like-sized blower of a Standard make, running both at the same time, from the same shaft, and at exactly the same speed. Your blower gives a slightly higher pressure and fully double the volume of the other. This result was obtained by carefully measuring the area of the discharge openings for the blast from both Blowers and yours would supply an opening of twice the area of the other blower before showing a diminution in the pressure of the blast.

Very truly, JAMES P. WILSON, Supt., TIRRILL'S GAS MACHINE CO., 14 Commercial St., Newark, N. J.

Manufactured and Sold by **J. B. & J. M. CORNELL,** **26th St. and 11th Avenue, NEW YORK CITY.**

All Orders Shipped Same Day as Received For

Plumbago, Talc, Sea Coal Facing
Stove Plate Facings, Shovels . . .
Riddles, Brushes. Bellows . . . . .

Molders' Tools, Chaplets, Pattern Letters, Pattern Lumber, Crucibles, Coke Forks . . Pattern Fillet Molasses, Flour, Core Compound, Fire Sand, Snap Flasks, Sand Sifting Machines, Etc., Etc. . . . . .

THE S. OBERMAYER CO.

CINCINNATI, O., and CHICAGO, ILLS.

CANADIAN AGENTS,

Dominion Foundry Supply Company,

MONTREAL, QUE. TORONTO, ONT.

Send for General Catalog No. 26.

SPECIAL NOTICE.

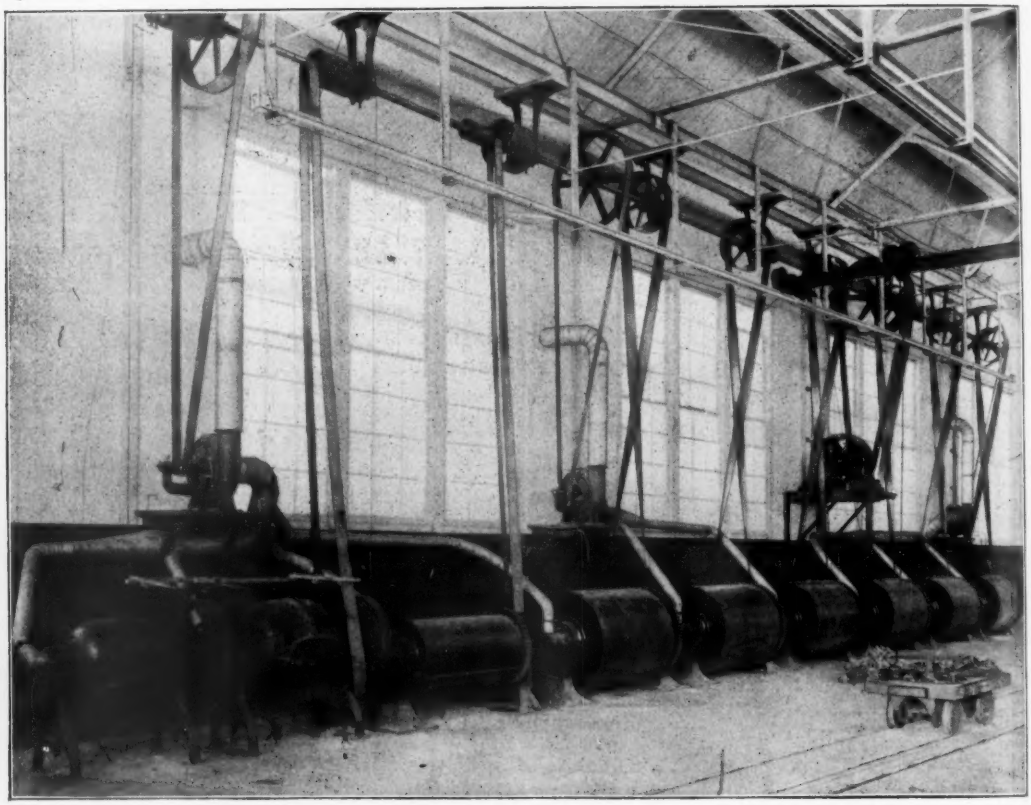
All Goods Guaranteed to be of the Best Quality and to Give the Very Best Satisfaction and Results.

SHIPPERS

Fire Brick, Cupola Blocks, Fire Clay, Kaolin, Ganister, Silica, Etc.

Paxson Exhaust Rumblers

MADE OF STEEL.



No Cast Iron Staves

BUT

One Solid Sheet of Steel.

Wide Door Extends Full Length of Mill.
Ribs on Inside to Keep Castings from Slipping.

We have lately installed a large gang of them in the works of the General Electric Company, Schenectady, N. Y., where they are run by electric motors. We also supplied them with two egg-shaped Rumblers, as shown in the cut.

These are the best and most economical Rumblers ever made.

J. W. Paxson Co. 1021 North Delaware Avenue, PHILADELPHIA, PA., U. S. A.

NEW

Paxson-Colliau Cupola

The more you examine it, the better you will like it . . . . . .

The Acme of Science in Cupola Construction . .

All that was Best in the old Colliau Cupola, with Every Improvement suggested by long experience added.

LOCATION AND AREA OF TUYERES INSURE THE HIGHEST MELTING . . . EFFICIENCY. . . . . .

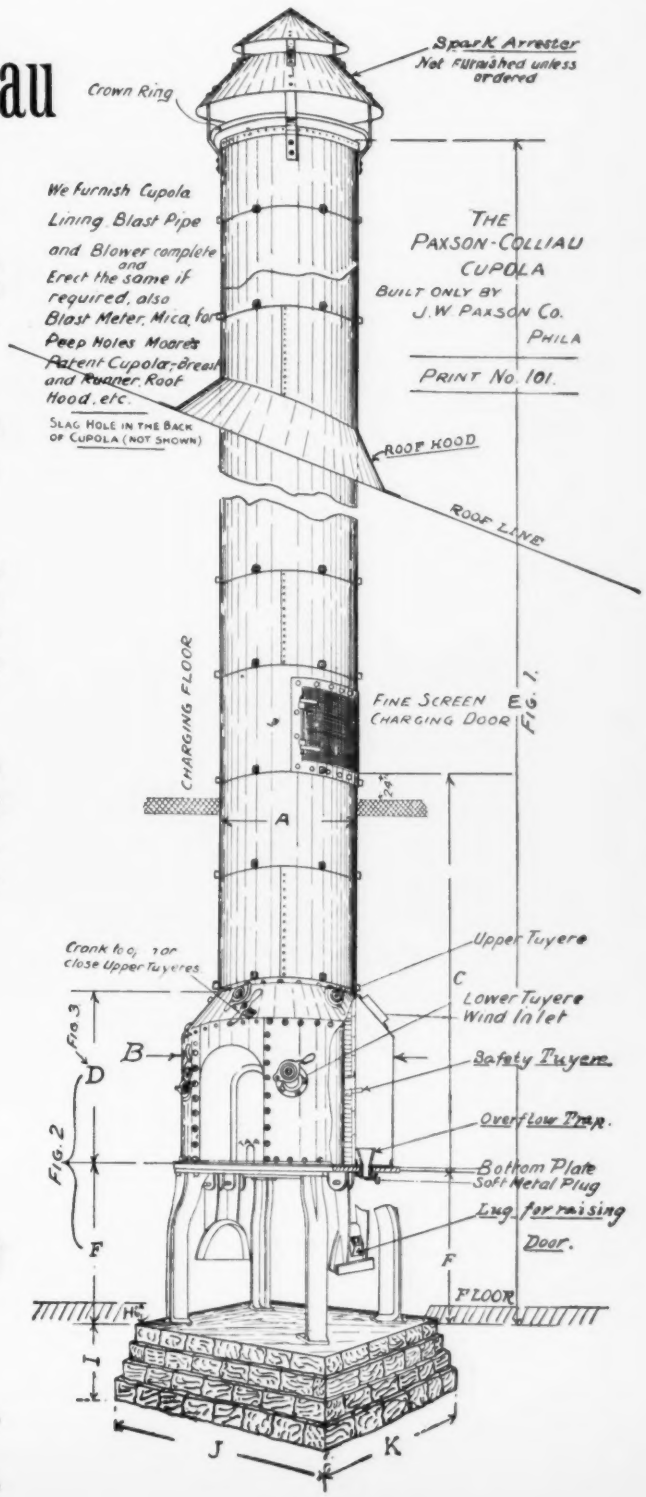
It keeps us hustling to fill the orders for these goods.

MADE ONLY BY THE

J. W. Paxson Co

1021 . . .
North Delaware Avenue,

PHILADELPHIA, PA., U. S. A.



Money for a Name!

For a Liquid Core Compound.

IT IS A WONDER

YOU DON'T NEED ROSIN.
YOU DON'T NEED FLOUR.
YOU DON'T NEED OIL.
YOU DON'T NEED MOLASSES.
YOU DON'T NEED ANYTHING BUT

? ? ? ? ? ?

to dampen the Core Sand with, to make the **Strongest, Best-Vented, Longest-Lasting Cores** without Smoke or Odor.

A Core made with ? ? ? ? ? will not Blow or Smell.

It will rap out easily. A most satisfactory Core Mixture for the most intricate core work. The material we now have; all we need is a name. We believe there is considerable in a name, and to get a good one for this good thing, we offer a Cash Prize of

$25.00

We will give this sum to the person who will send us the name we will adopt for this Compound. If more than one person sends us the same name, we will divide the amount equally among them. All answers must reach us not later than June 25, 1899.

Write plainly on white paper and address

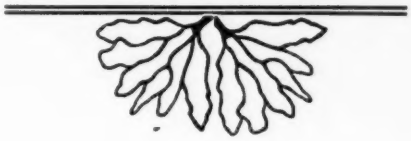
The J. D. Smith Foundry Supply Co., CINCINNATI, OHIO.

The name or names of winners will be published in the July Foundry.

Whitehead Brothers Company,

DEALERS IN

Molding Sand



FIRE SAND,
PHILADELPHIA SAND
FRENCH SAND,
FIRE CLAY, KAOLIN,
FOUNDRY FACINGS
and SUPPLIES
OF ALL KINDS.
LEAD FACINGS
A SPECIALTY.

Albany Sand for Brass and Stove Plate Castings.

537=39 West 27th St.,
NEW YORK.

Providence Office,
42 S. Water Street.

Buffalo Office,
70 and 72 Columbia St.

WORKS AT

CHEESEQUAKE CREEK, N. J.
SOUTH RIVER, N. J.
RARITAN RIVER, N. J.
SOUTH AMBOY, N. J.
WAREHAM, MASS.
CENTRE ISLAND, L. I
WATERFORD, N. Y.
ALBANY N. Y.
CEDAR HILL, N. Y.
COXSACKIE, N. Y.
CLINTON POINT, N. Y.
ATHENS, N. Y.
COEYMANS, N. Y.
WILLOW SPRINGS, N. Y.
POUGHKEEPSIE, N. Y.
CRESCENT, N. Y.

We Guarantee..

That one man with one of our **PNEUMATIC HAMMERS** can do more and better work than four men working in the ordinary way.

These same Hammers are also especially adapted for calking boilers and beading flues.

We also manufacture the best Air Drill on the market, and our Air Hoist and Compressors are especially designed for foundry work.

All tools sent on ten days' trial, subject to approval and are guaranteed for one year.

Chicago Pneumatic Tool Co.,

635 Monadnock Building, CHICAGO, ILL.

P. G. COCHRAN, PRESIDENT.
J. H. WURTZ, SECRETARY.

J. R. LAUGHREY, TREASURER.
J. S. NEWMYER, MANAGER.

WASHINGTON COAL & COKE CO.

CAPITAL, PAID UP, $500,000.

3500 Acres of Coal.

5000 Tons Daily Capacity.

300 30-TON COAL CARS

50 30-TON COKE CARS.

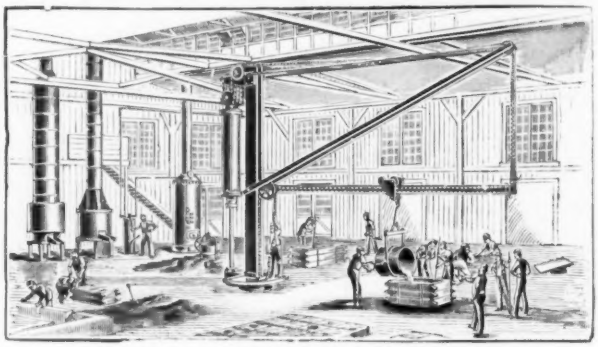
Foundry Coke Our Specialty.

GENERAL OFFICE—
DAWSON, FAYETTE CO., PA.

SALES OFFICE—PITTSBURG, PA.
N. P. HYNDMAN, SALES AGENT.

SPENDIN' MONEY ADVERTISIN'

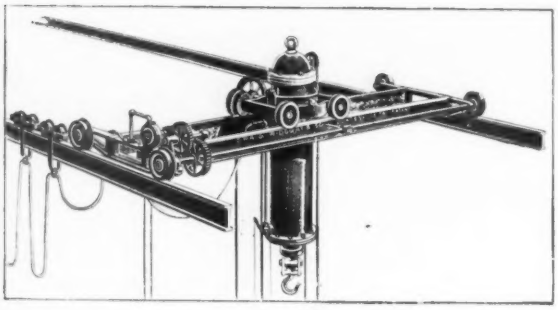
Just to have you know about our Steam-Hydraulic and our wonderful Balanced Crane. If all the mill owners in the land just understood the thing, forty shops like ours could not make these cranes fast enough. That's why we keep a crying "investigate." You never heard us ask anybody to buy a crane in your life. We just merely say "find out about it," for when a man finds out about it he is not long in getting the Ridgway Crane. You can work the Ridgway Crane just as well with compressed air as with steam, to be sure, but you can work with steam when the air compressor is broken down, and when you have no air compressor maybe you won't need one if you have Ridgway Cranes.



5-Ton Steam Hydraulic Crane in a Foundry.

At any rate, look into the Ridgway Crane. We are placing lots of them and people are not getting them for their health.

HYDRAULIC AIR HOISTS.



Little oil in the piston rod governs them and they can't run away. The only air hoist to get. Costs more to build than other hoists, but are worth the difference many times over. Not a question of selling them now, since they are getting known, but a question of getting them made.

"PLEASE TAKE THE ELEVATOR"

You're foolin' money away by getting anything else.

CRAIG RIDGWAY & SON, COATESVILLE, PA.

EUROPEAN AGENT,

CHAS. G. ECKSTEIN, 16 Spandauerstr., Berlin, Germany.

William Sellers & Co., Incorp.

PHILADELPHIA.

MODERN FOUNDRY MACHINERY

SAND MIXER.

Not an Experiment

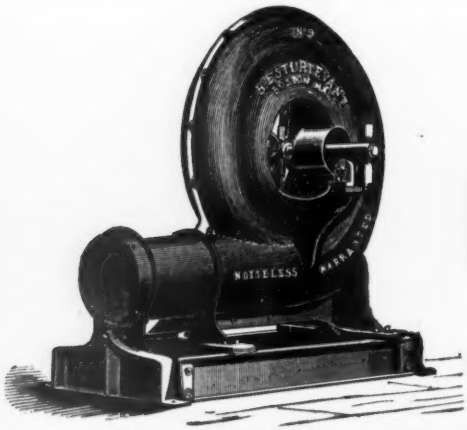
PRACTICAL.

ECONOMICAL.

EXPEDITIOUS.

NOTE. — The old-fashioned method of sifting sand has been to a large degree superseded in modern foundries by the Superior Centrifugal Method, and the machine illustrated herewith is a real labor saver.

Correspondence Is Solicited.



Blower on Adjustable Bed.

THE STURTEVANT STEEL Pressure Blowers,

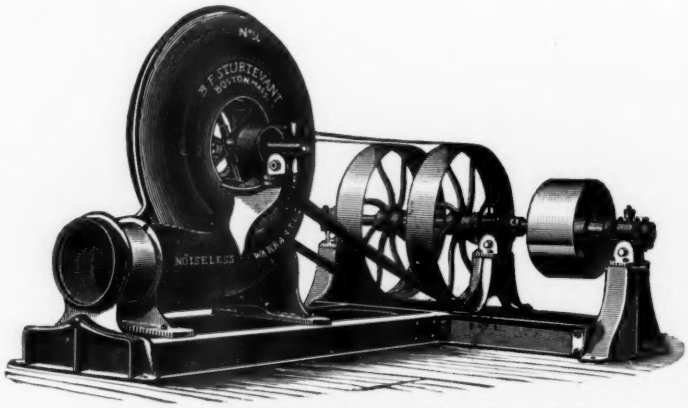
—FOR—

Cupola Furnaces and Forge Fires.

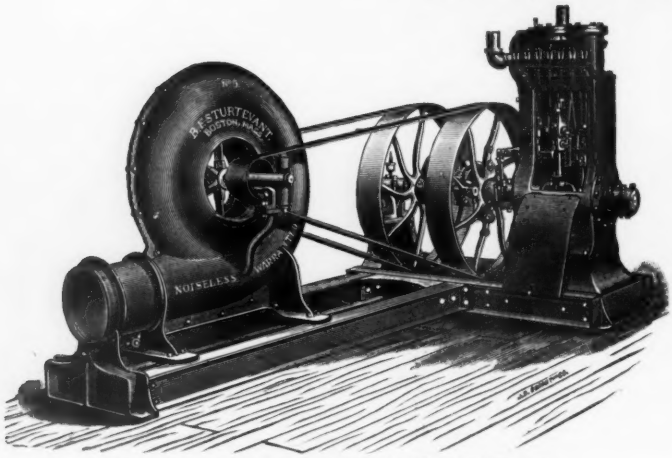
BLOWERS

Furnished without Bed with Separate Countershaft

BLAST GATES



Blower on Adjustable Bed with Combined Countershaft.



Blower on Adjustable Bed with Double Enclosed Engine.

BLOWERS

WITH

THE STURTEVANT

Direct Connected

Electric Motors

Send for Catalogue.

B. F. STURTEVANT CO.,

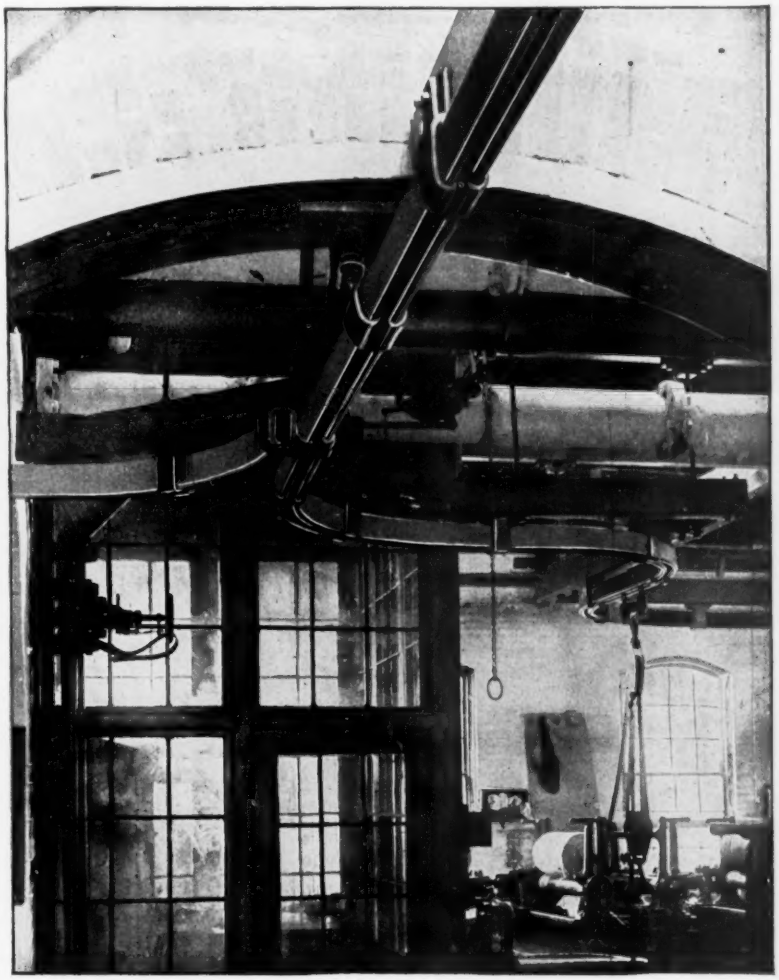
BOSTON MASS.

131 Liberty Street, NEW YORK, 135 N. Third St., PHILADELPHIA.
16 S. Canal St., CHICAGO. 75 Queen Victoria St., LONDON.

STOCK CARRIED AT BRANCHES.

OVERHEAD TROLLEY TRACK.

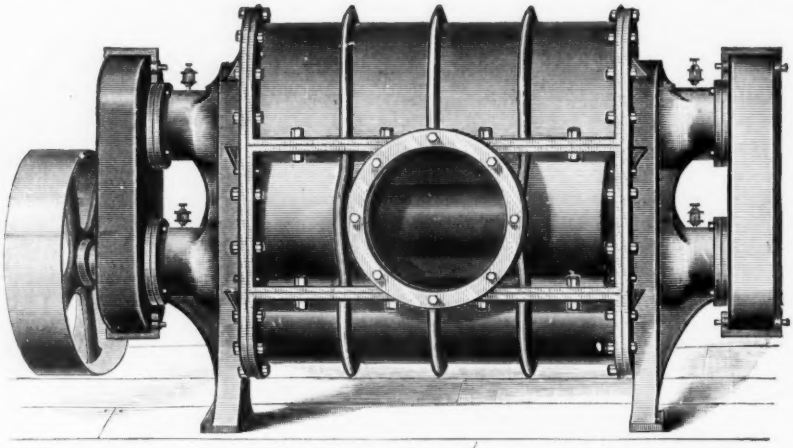
The Overhead Trolley Track occupies no room that can be otherwise employed. It is never obstructed and can be easily used at all times for transportation of materials, machinery or articles of any kind. Its great advantage in most foundries, however, arises from the economy resulting from its use as an aid in getting iron quickly from cupola to floors with a small fraction of the labor usually employed. Our Catalogue (sent free an application) illustrates in detail the construction of parts.



We have foundry customers who are handling 25 to 40 tons of hot metal per day on our Patent Trolley Track Tramway System. It pays for itself in a short time. You cannot afford to be without it. Send detailed sketch or blue print of your requirements. We will reply promptly. We can do you a good turn.

Coburn Trolley Track Mfg. Co. HOLYOKE, MASS.

The Green Rotary Pressure Blower



Working parts are two perfectly balanced impellers, mounted on the best steel shafts, running in bronze bushes, detachable journal bearings, cut gearing at both ends of the Blower enclosed in oil-tight casing.

Weighs less, occupies less space, costs less for freight than any other POSITIVE BLOWER in existance.

FOUNDRY BLOWERS

High Pressure Blowers

GAS EXHAUSTERS

Exhausters for Hot Gases

The GREEN Gives the Most Value for a $.

Wilbraham Baker Blower Co

2518 Frankford Ave. PHILADELPHIA, PA.

Sales Agents: **Frazer & Chalmers, Inc.** CHICAGO, ILL., and BRANCH HOUSES.

Over
15,000
in Use.

ALWAYS READY!

800 TO 2000 CANDLE POWER.

ESPECIALLY ADAPTED FOR

FOUNDRIES

PORTABLE, SELF-CONTAINED, AUTOMATIC.

NO SMOKE! NO SPRAY! NO SHARP SHADOWS!

Now in Valuable Use With Hundreds of Foundries,

In addition to 400 Railroads and over 500 Contractors.

REQUEST CIRCULARS FROM

THE WELLS LIGHT M'F'G. CO.,

EDWARD ROBINSON, Sole Proprietor.

44-46 WASHINGTON STREET, NEW YORK.

ROSS-MEEHAN FOUNDRY CO.,
CHATTANOOGA, TENN., May 5, 1896.

The Wells Light M'f'g. Co., Nos. 44 and 46 Washington St., New York City:

GENTLEMEN—It is contrary to our rule to give testimonials, but an article with the merit of your Wells Light deserves to be made an exception. We have used your lights for the past five years, and consider them indispensable to us.

Yours very truly,
ROSS-MEEHAN FOUNDRY CO.
P. A. BRAWNER, JR., Sec'y. & Treas.

Crucibles

CRUCIBLES for Brass Melting.
CRUCIBLES for Steel Melting.
CRUCIBLES made specially for the different Metals.

CRUCIBLES for Oil Fires.
CRUCIBLES for Coal Fires.
CRUCIBLES for Coke Fires.
CRUCIBLES for Gas Fires.

We recognize the fact that different metals and different fires demand different crucible mixtures for the best results and we are prepared in every way to meet that demand.

Although we are the oldest crucible manufacturers in the world, we are up-to-date in every particular, and the knowledge of our chemists and our skilled workmen is at the service of our customers. If you are not quite satisfied with your crucibles or their work, possibly we can help you. We shall be glad to answer any inquiries.

Joseph Dixon Crucible Co.

JERSEY CITY, N. J.

CRUCIBLES.

McCULLOUGH-DALZELL COMPANY

PITTSBURG, PA.

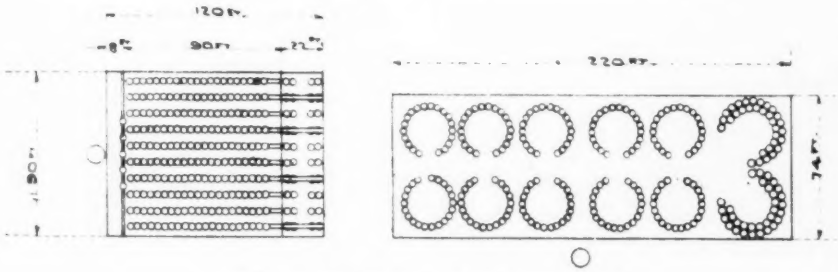
CAST IRON CHILLED CAR WHEELS

PRONOUNCED SUPERIOR TO STEEL TIRED WHEELS.
IN UNIVERSAL USE ON ALL RAILROADS IN U. S.

Manufactured Most Economically With

THE WHITING SYSTEM

Under the Old Method 50 per cent. more space is required than with the Whiting.



THESE PLANS ARE DRAWN TO SAME SCALE.

A Ten-Floor Plant of THE WHITING SYSTEM; average daily capacity, 210 wheels. Molding and pitting area, 10,800 square feet.

A Ten-Floor Plant of any JIB CRANE SYSTEM, HAND, HYDRAULIC or BELT POWER; average daily capacity, 200 wheels. Molding and pitting area, 16,250 square feet.

Send for estimates and prints, giving capacity per day, size of shop, etc. We design and manufacture complete plants for Car Wheel, Pipe and General Foundries at home or abroad, MALLEABLE AND OPEN HEARTH STEEL PLANTS.

Electric and Hand Power Travelers, Air Hoists, Receivers, Etc.

CUPOLAS LADLES, TUMBLERS AND . . ALL FOUNDRY EQUIPMENTS.

ENGINEERS AND DESIGNERS OF FOUNDRIES.

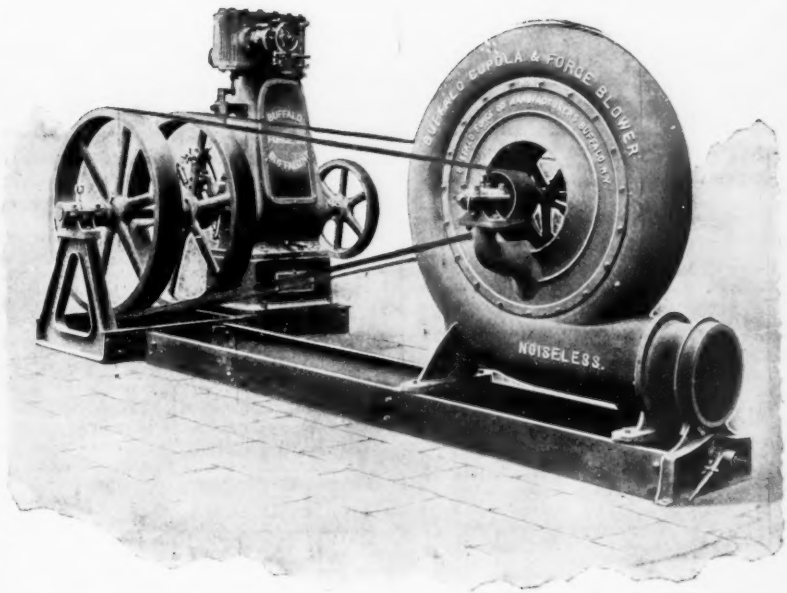
Whiting Foundry Equipment Co.

GENERAL OFFICE AND WORKS; **HARVEY, ILL., U.S.A.** (CHICAGO SUBURB.)

CHICAGO OFFICE: 1543 MARQUETTE BUILDING.

BUFFALO CUPOLA BLOWERS.

BUFFALO TUMBLING BARREL EXHAUSTERS.



Buffalo Steel Pressure Blower on Adjustable Bed, with Combined Engine and Countershaft.

Buffalo Forge Company,

BUFFALO, N. Y., U. S. A.

The Buffalo Fan System of Heating and Ventilating Foundries, Machine Shops, and all Large Buildings.

The Buffalo Forge Company Engine for Select Service. Highest Award and Gold Medal, Omaha, 1898.

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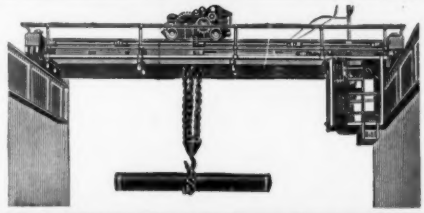
demands that a Journal should treat every advertiser alike . .

THE FOUNDRY **has but one rate. No reduction to Advertising Agencies . . . . . .**

Full Page, - per month,	$25.00
Half " - "	15.00
Quarter Page, "	8.50

CRANES AND HOISTING MACHINERY



ELECTRICAL STEAM BELT AND HAND POWER

THE CASE MFG CO.

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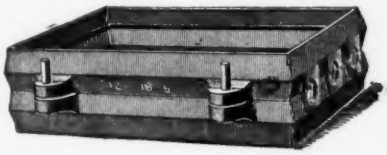

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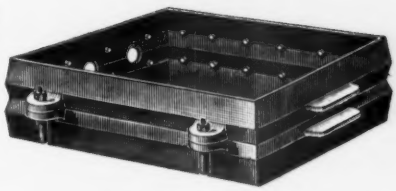
Ribs in Beveled Flasks add to the weight and obstruct ramming—do you want them? You are the Doctor!



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Made in 1898.

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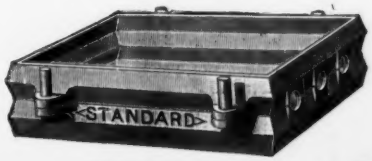

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DEMEREST'S PATENT, 1865.

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IT LEADS.
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In making your contracts for 1899 for Lake Superior Charcoal Pig Iron, it would do no harm to take up the question of

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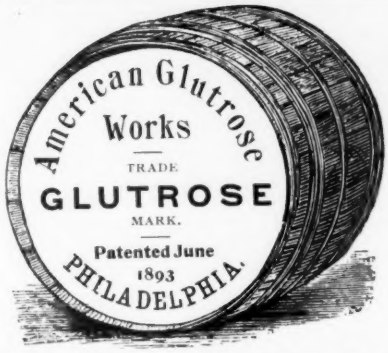

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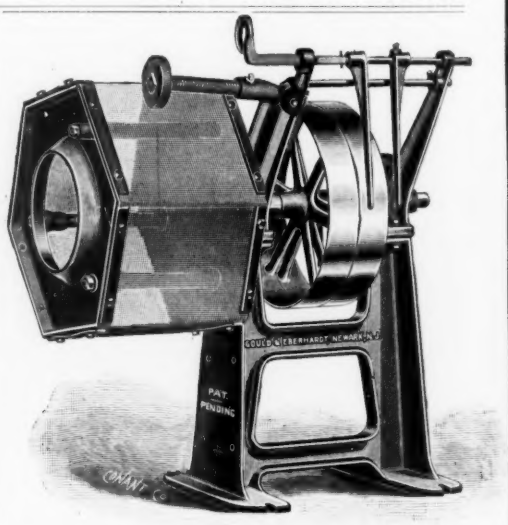

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GENTLEMEN—As to the working of the Sand Sifter, it is *more than satisfactory*. After using a shaker, which not only shook the sand, but also shook itself apart periodically, it is a great relief, doing its work *quietly* and *thoroughly*, and we shall be pleased to recommend it to anyone you may refer to us. Yours truly,

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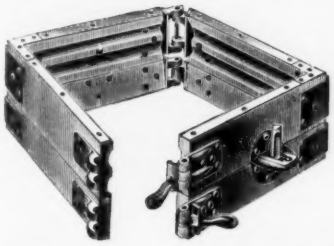

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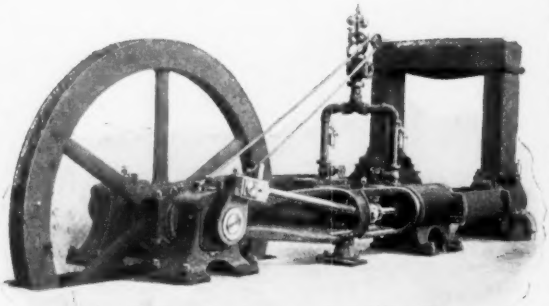

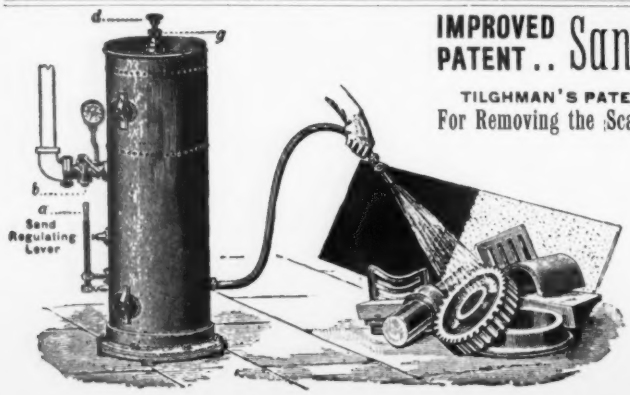

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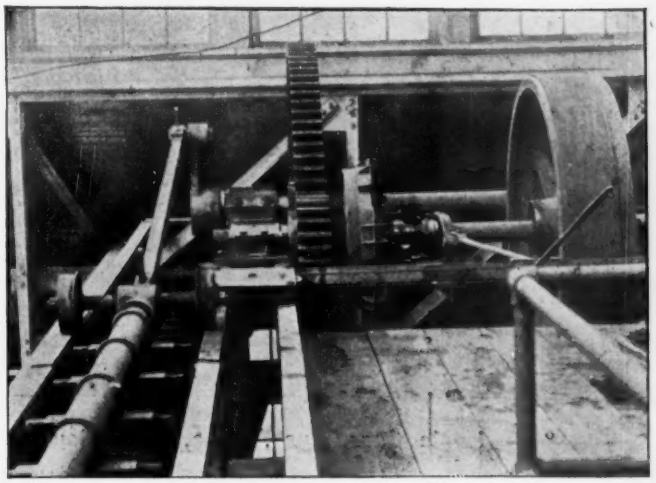

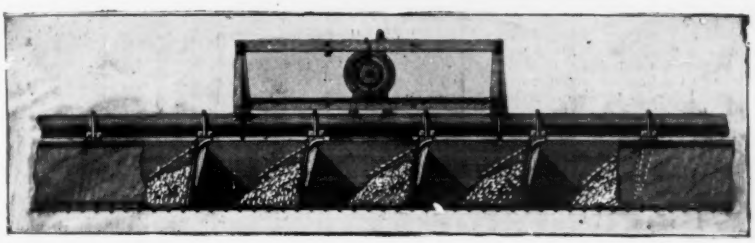

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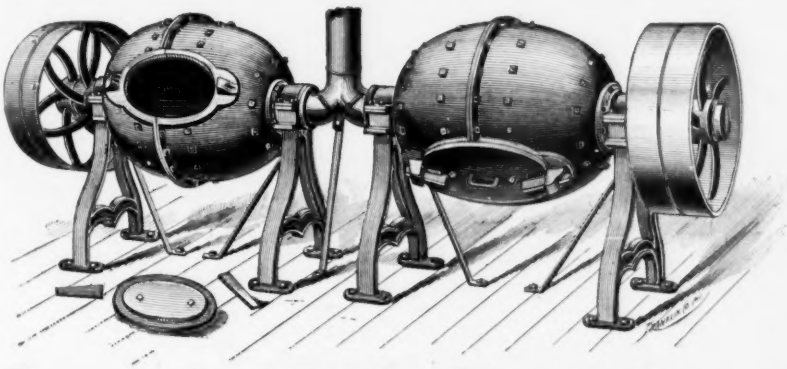

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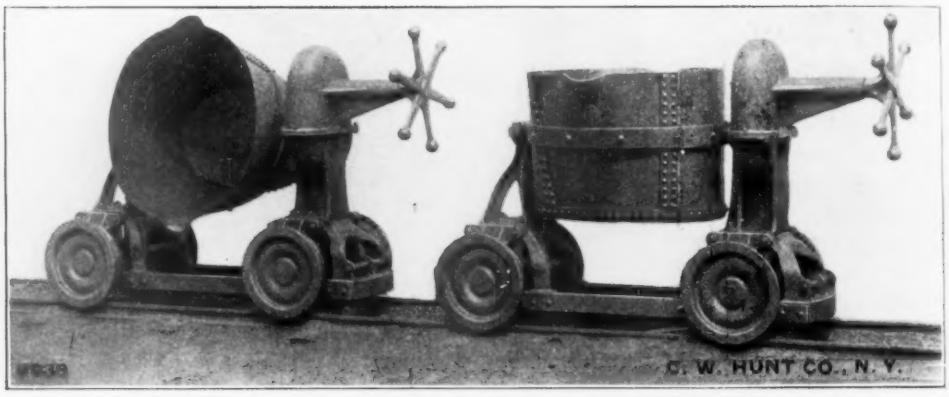

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Many foundrymen believe that these cars are not only more convenient to use in distributing molten metal, but are also safer than any overhead system of cranes or tackles. No accident has ever occurred in the use of these cars. The height of the top of the ladle above the rails, when upright, is 26 inches; for convenience in pouring into hand ladles, the shape of the body and the position of the trunnions are arranged so that the spout, when tipped, pours into a ladle 17 inches high. The gear for revolving the ladle, is our patent cam gear, that locks the ladle in every position, and possesses the remarkable feature of having both shafts revolve in the same direction. When the handles are moved, the ladle moves steadily in the same direction as the handles, but only one-twelfth as fast.

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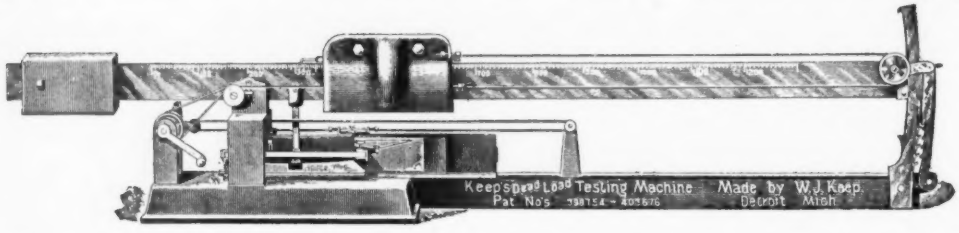

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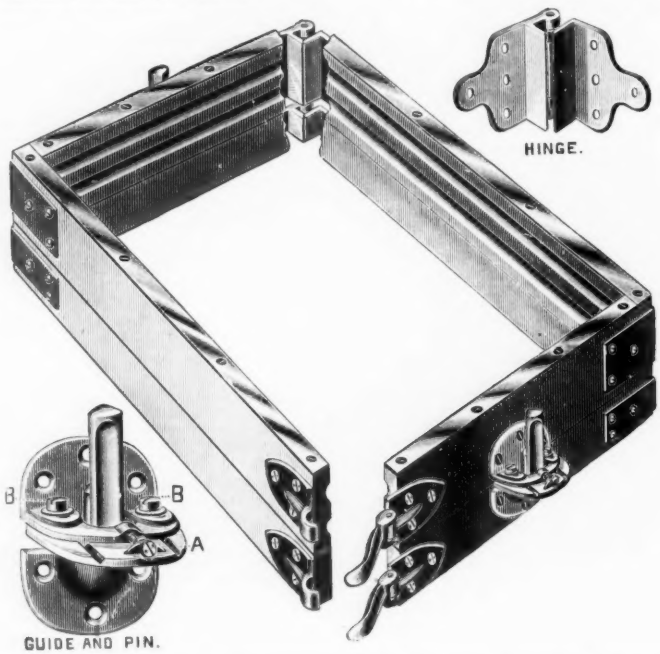

These sizes, which are inside measurement, with 2-inch nowel and 3-inch cope, are kept in stock:

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2	9x14	9	10x14	16	11x14	23	12x14
3	9x15	10	10x15	17	11x15	24	12x15
4	9x16	11	10x16	18	11x16	25	12x16
5	9x17	12	10x17	19	11x17	26	12x17
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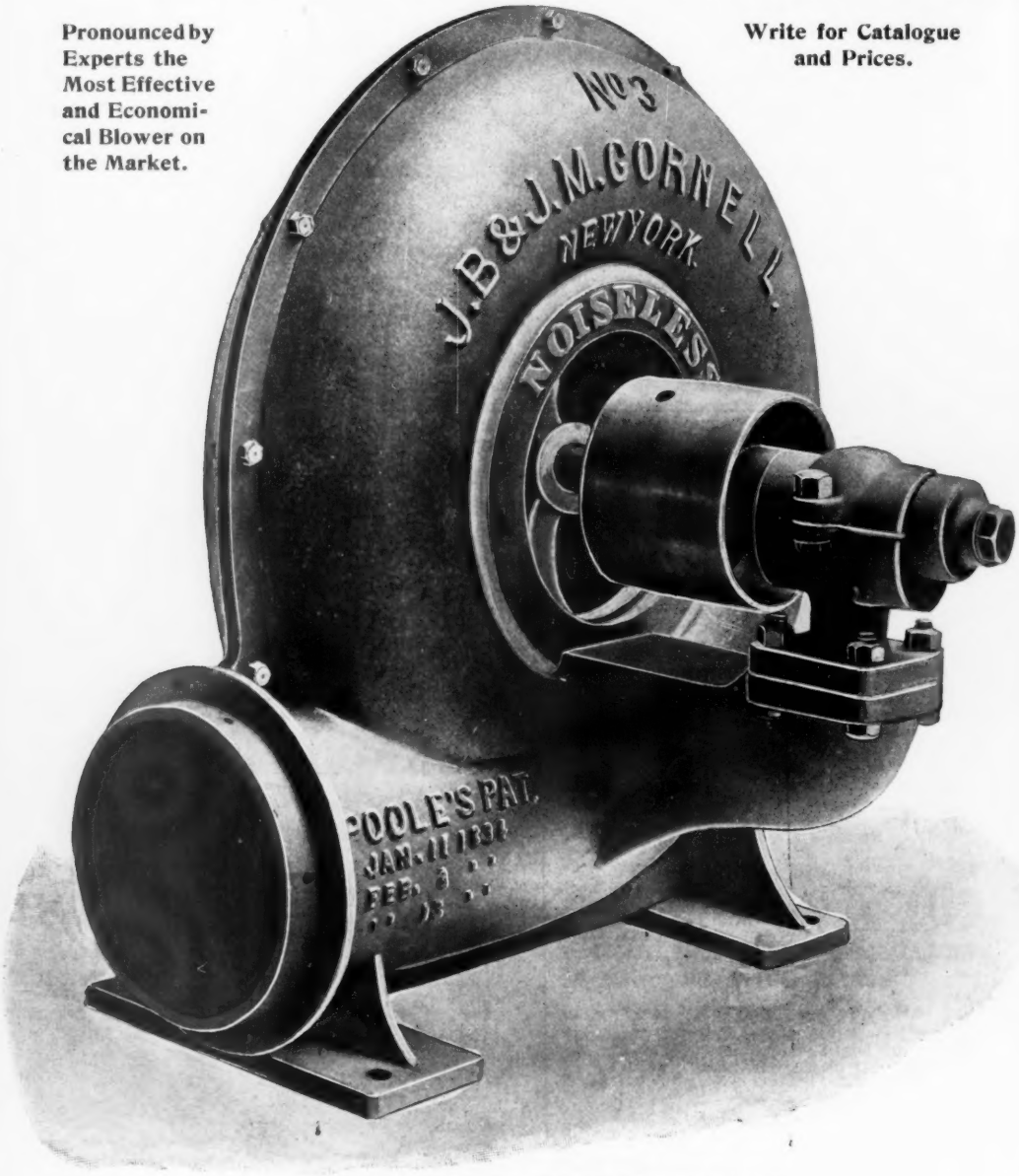

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MESSRS. J. B. & J. M. CORNELL: NEW YORK, Jan. 28, 1890.

Replying to your favor relative to the blower we purchased of you, we beg to say that we have found it to work satisfactory, and with very much less power than any we have ever used.

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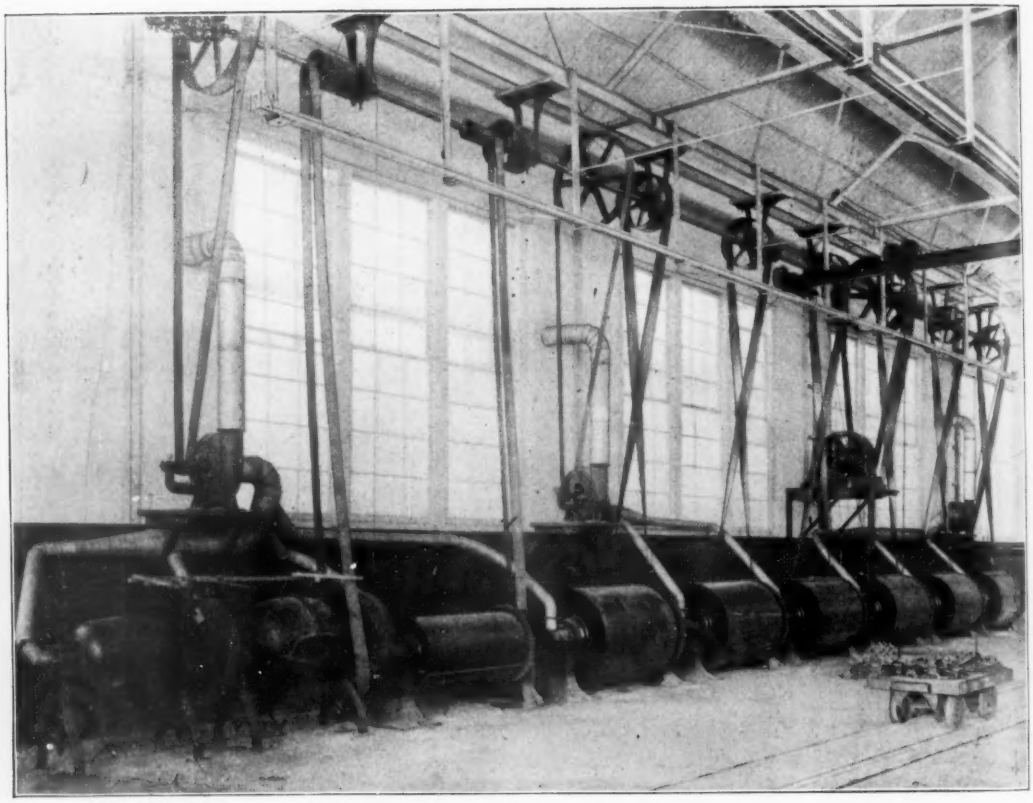
Paxson Exhaust Rumblers

MADE OF STEEL.



No Cast Iron Staves

BUT

One Solid Sheet of Steel.

Wide Door Extends Full Length of Mill.
Ribs on Inside to Keep Castings from Slipping.

We have lately installed a large gang of them in the works of the General Electric Company, Schenectady, N. Y., where they are run by electric motors. We also supplied them with two egg-shaped Rumblers, as shown in the cut.

These are the best and most economical Rumblers ever made.

J. W. Paxson Co.

1021 North Delaware Avenue,
PHILADELPHIA, PA., U. S. A.

NEW

Paxson-Colliau Cupola

The more you examine it, the better you will like it . . . . . .

The Acme of Science in Cupola Construction . .

All that was Best in the old Colliau Cupola, with Every Improvement suggested by long experience added.

LOCATION AND AREA OF TUYERES INSURE THE HIGHEST MELTING . . . EFFICIENCY. . . . . .

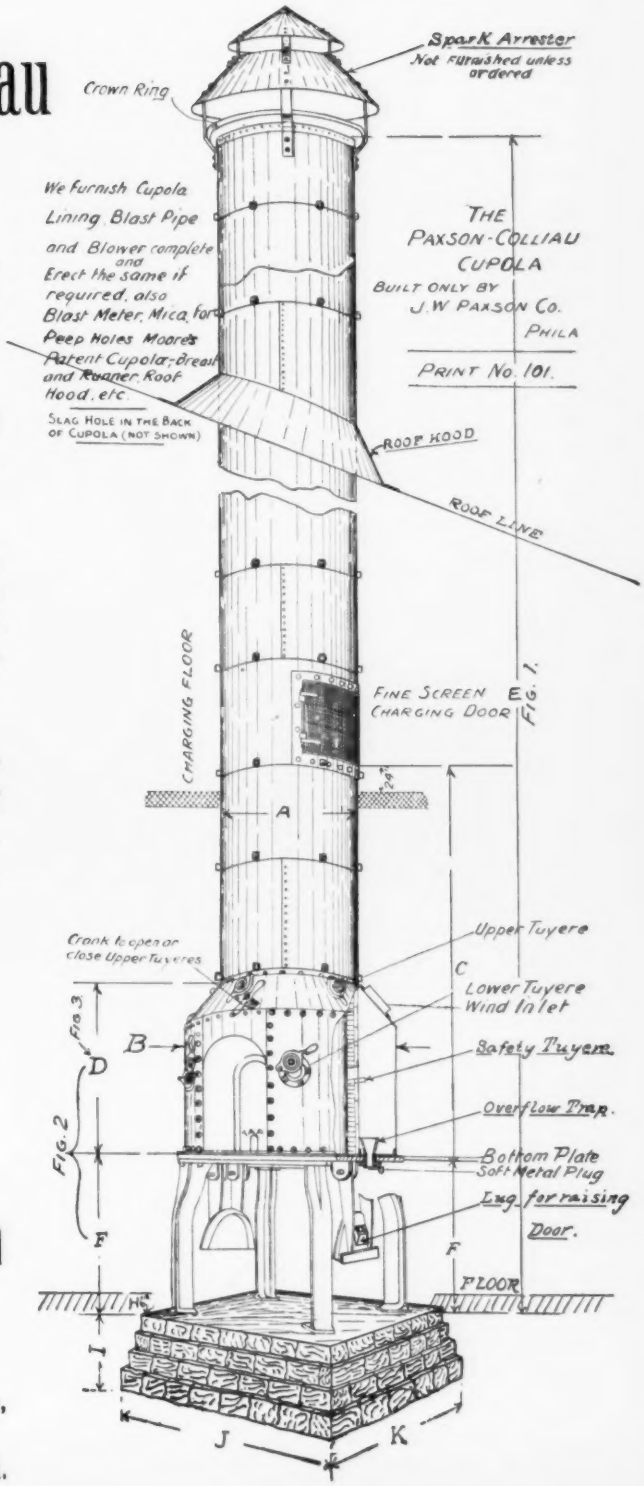
It keeps us hustling to fill the orders for these goods.

MADE ONLY BY THE

J. W. Paxson Co

1021 . . .
North Delaware Avenue,

PHILADELPHIA, PA., U. S. A.



"COREKA"

IS A WONDER!

A colorless, tasteless, harmless liquid used to dampen core sand with, to make **strong well-vented cores,** with no **Smoke, Smell, Blow or Swell without the need of using Rosin, Flour, Oil or Molasses.**

Used by hundreds of Foundries. Full directions with every shipment.

PRICES.

By the Barrel, - -	25c per gallon.
By the One-Half Barrel, - -	28c "
15 Gallon Kegs, - -	30c "
10 " " - -	35c "
5 " " - - -	40c "
1 " Cans, - -	50c each.
1 Quart " - - -	25c "

INCLUDING PACKAGES.

MANUFACTURED ONLY BY

The J. D. Smith Foundry Supply Co

CINCINNATI, OHIO.

W. W. HARRIS,

Foreman of Miller's Iron Foundry, PROVIDENCE, R. I.

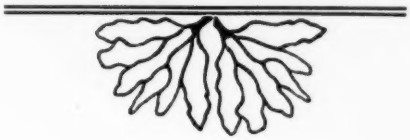
has sent us his acknowledgment for $25.00 we sent him for the name of

"COREKA."

Whitehead Brothers Company,

DEALERS IN

Molding Sand



FIRE SAND,
PHILADELPHIA SAND
FRENCH SAND,
FIRE CLAY, KAOLIN,
FOUNDRY FACINGS
and SUPPLIES
OF ALL KINDS.
LEAD FACINGS
A SPECIALTY.

Albany Sand for Brass and Stove Plate Castings.

537=39 *West 27th St.,*
NEW YORK.

Providence Office,
42 S. Water Street.

Buffalo Office,
70 and 72 Columbia St.

WORKS AT

CHEESEQUAKE CREEK, N. J.
SOUTH RIVER, N. J.
RARITAN RIVER, N. J.
SOUTH AMBOY, N. J.
WAREHAM, MASS.
CENTRE ISLAND, L. I
WATERFORD, N. Y.
ALBANY N. Y.
CEDAR HILL, N. Y.
COXSACKIE, N. Y.
CLINTON POINT, N. Y.
ATHENS, N. Y.
COEYMANS, N. Y.
WILLOW SPRINGS, N. Y.
POUGHKEEPSIE, N. Y.
CRESCENT, N. Y.

We Guarantee..

That one man with one of our **PNEUMATIC HAMMERS** can do more and better work than four men working in the ordinary way.

These same Hammers are also especially adapted for calking boilers and beading flues.

We also manufacture the best Air Drill on the market, and our Air Hoist and Compressors are especially designed for foundry work.

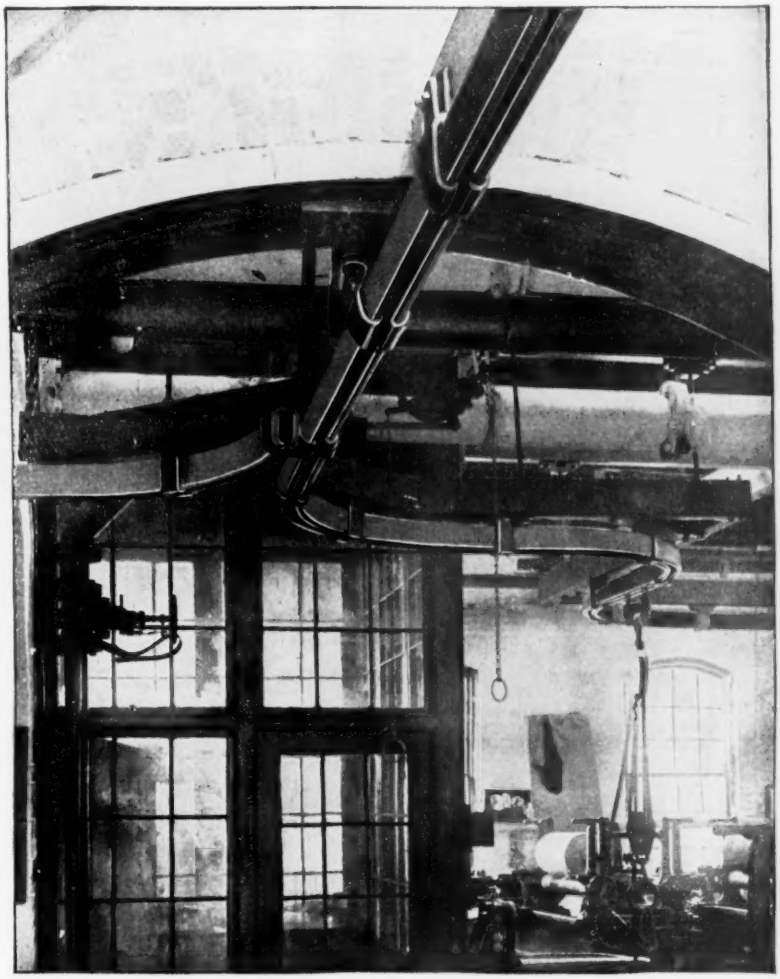
All tools sent on ten days' trial, subject to approval and are guaranteed for one year.

Chicago Pneumatic Tool Co.,

635 Monadnock Building, CHICAGO, ILL.

OVERHEAD TROLLEY TRACK.

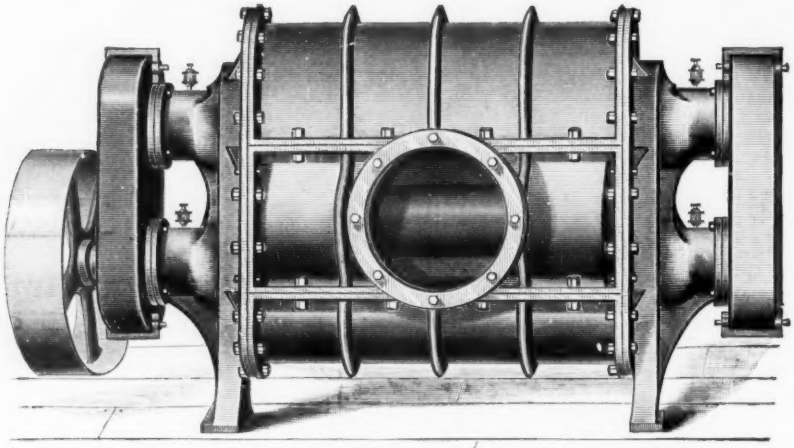
The Overhead Trolley Track occupies no room that can be otherwise employed. It is never obstructed and can be easily used at all times for transportation of materials, machinery or articles of any kind. Its great advantage in most foundries, however, arises from the economy resulting from its use as an aid in getting iron quickly from cupola to floors with a small fraction of the labor usually employed. Our Catalogue (sent free an application) illustrates in detail the construction of parts.



We have foundry customers who are handling 25 to 40 tons of hot metal per day on our Patent Trolley Track Tramway System. It pays for itself in a short time. You cannot afford to be without it. Send detailed sketch or blue print of your requirements. We will reply promptly. We can do you a good turn.

Coburn Trolley Track Mfg. Co. HOLYOKE, MASS.

The Green Rotary Pressure Blower



Working parts are two perfectly balanced impellers, mounted on the best steel shafts, running in bronze bushes, detachable journal bearings, cut gearing at both ends of the Blower enclosed in oil-tight casing.

Weighs less, occupies less space, costs less for freight than any other POSITIVE BLOWER in existance.

FOUNDRY BLOWERS

High Pressure Blowers

GAS EXHAUSTERS

Exhausters for Hot Gases

The GREEN Gives the Most Value for a $.

Wilbraham Baker Blower Co

2518 Frankford Ave. PHILADELPHIA, PA.

Sales Agents: **Frazer & Chalmers, Inc.** CHICAGO, ILL., and BRANCH HOUSES.

Speaking About Watermelons——

Say!

You know Ayers? Ayers, of Zanesville? E. M. Ayers, Zanesville, Ohio? The Sand Man? Who doesn't know . . . .

Ayers, the Sand Man?

Been in the business for eighteen years! Eighteen years of unvarying success attest his knowledge of the business. When you buy sand of Ayers, you are not taking any chances. No experiment about it. Ayers did the experimenting (paying the expense out of his own pocket) in the early days and his customers are now getting the benefit of his ripe experience. All grades of Molding Sand and every shovelful of uniform quality, and that quality the BEST!

FIRE! FIRE!! FIRE CLAY, of the Highest Grade! See?

E. M. AYERS

Market Block,

ZANESVILLE, OHIO.

H. S. VROOMAN, Western Agent, 220 W. 20th Street, CHICACO.

Crucibles

CRUCIBLES for Brass Melting.
CRUCIBLES for Steel Melting.
CRUCIBLES made specially for the different Metals.

CRUCIBLES for Oil Fires.
CRUCIBLES for Coal Fires.
CRUCIBLES for Coke Fires.
CRUCIBLES for Gas Fires.

We recognize the fact that different metals and different fires demand different crucible mixtures for the best results and we are prepared in every way to meet that demand.

Although we are the oldest crucible manufacturers in the world, we are up-to-date in every particular, and the knowledge of our chemists and our skilled workmen is at the service of our customers. If you are not quite satisfied with your crucibles or their work, possibly we can help you. We shall be glad to answer any inquiries.

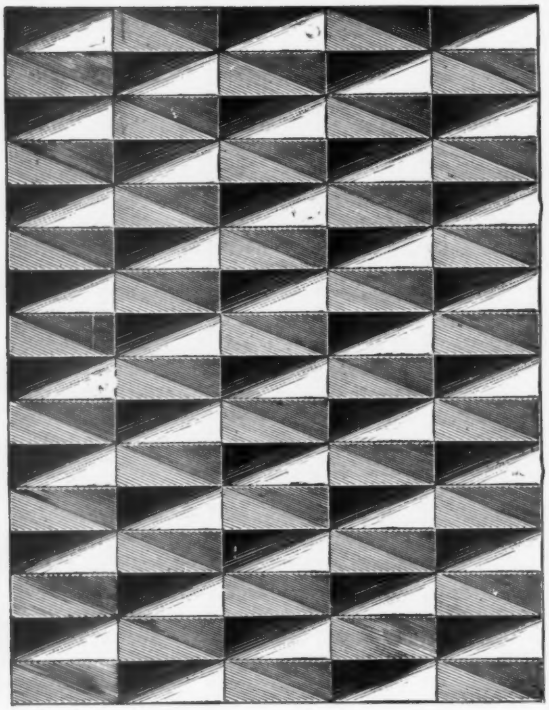
Joseph Dixon Crucible Co.

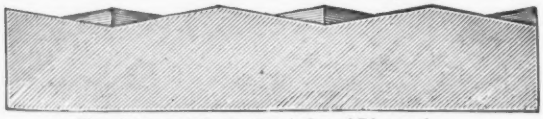
JERSEY CITY, N. J.

CRUCIBLES.

McCULLOUGH-DALZELL COMPANY

PITTSBURG, PA.





The above cut shows exact size of Diamonds.

Diamond Pattern Lumber,

—FOR—

DOOR SILLS, PLATFORMS, STEP PLATES, Etc.

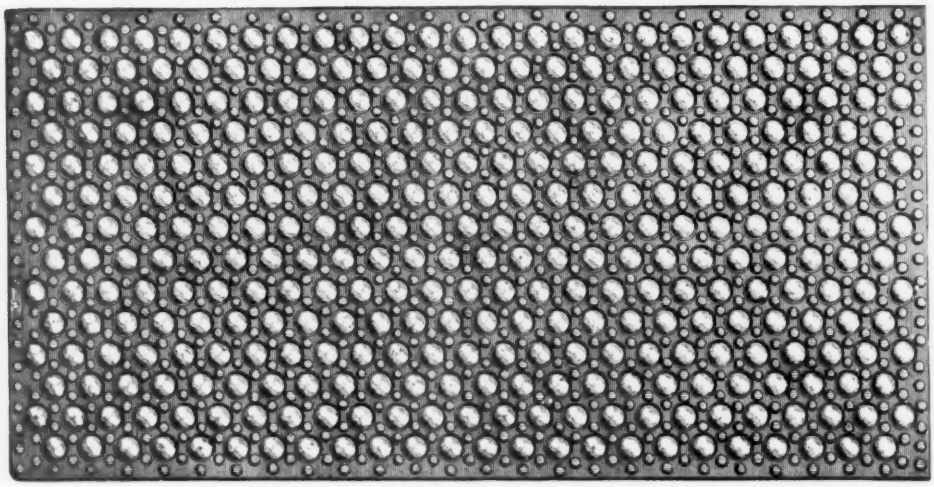
This Patent Lumber is made by a Specia Machine invented by us, the ONLY Machine of its kind, and each piece will match PERFECTLY with all other pieces, by "joining" the edges to the centre, lengthwise, or any row of Diamonds.

Size of each piece, 8 feet long by 6 inches wide, and ½ inch thick. Price 10 cents per running foot of 6 inches in width, NET CASH crated and delivered f. o. b. Chicago, in orders of not less than 6 pieces. Send for sample.

BROWN BROS. MFG. CO.

Cor. Clinton and Jackson Sts. Chicago.

PRISMATIC SIDEWALK LIGHT TILE.



Make your own frames and we will furnish you with Tiles for either Iron or Concrete Lights. Write for prices.

BROWN BROS. MFG. CO.,

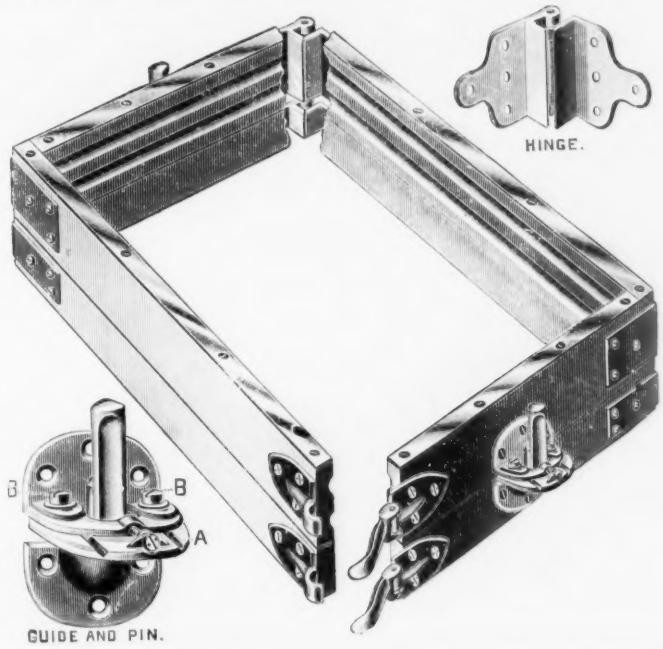
Cor. Jackson and Clinton Sts. CHICAGO.

Stearns Improved Snap Flask

Cheaper Than You Can Make Your Own.

The large "V" shaped pins with corresponding bearings insure a level lift of the cope, enabling comparatively inexperienced help to mold difficult patterns.

The inner edges of the malleable iron hinge are beveled, bringing the corners perfectly true. The flasks are made of whitewood—light in weight, yet stiff and strong, edges and corners bound with iron.



These sizes, which are inside measurement, with 2-inch nowel and 3-inch cope, are kept in stock:

No.	Sizes.	No.	Sizes.	No.	Sizes.	No.	Sizes.
1	9x13	8	10x13	15	11x13	22	12x13
2	9x14	9	10x14	16	11x14	23	12x14
3	9x15	10	10x15	17	11x15	24	12x15
4	9x16	11	10x16	18	11x16	25	12x16
5	9x17	12	10x17	19	11x17	26	12x17
6	9x18	13	10x18	20	11x18	27	12x18
7	9x19	14	10x19	21	11x19	28	12x19

PRICE, $2 50 Each. Special Sizes furnished at an advance of **25** cents, net, each.

The metal furnishings, only, will be sold to parties desiring to make up their flasks. **Price, $1.50 per set.**

E. C. STEARNS & COMPANY, Syracuse, N. Y.

Makers of STEARNS BICYCLES and Manufacturers of Hardware.

Whiting Foundry Equipment Co.

GENERAL OFFICE AND WORKS; HARVEY, ILL., U.S.A. (CHICAGO SUBURB.)
CHICAGO OFFICE: 1543 MARQUETTE BUILDING.

CUPOLAS
TUMBLERS
LADLES
SIFTERS

AIR HOISTS
RECEIVERS
TURNTABLES
TRUCKS, ETC.

ENGINEERS and DESIGNERS of COMPLETE PLANTS
For the Manufacture of

Cast Iron Chilled Car Wheels

(WHITING PATENT SYSTEM.)

Cast Iron Pipe

(GAS and WATER.)

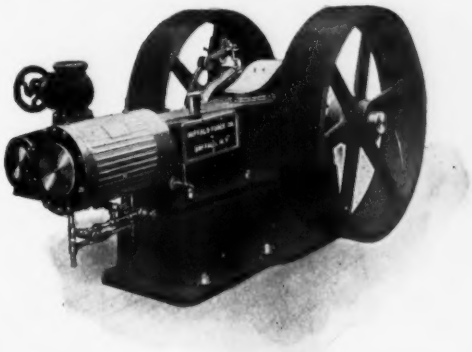
Malleable and Steel Castings

OUR SPECIALTY—

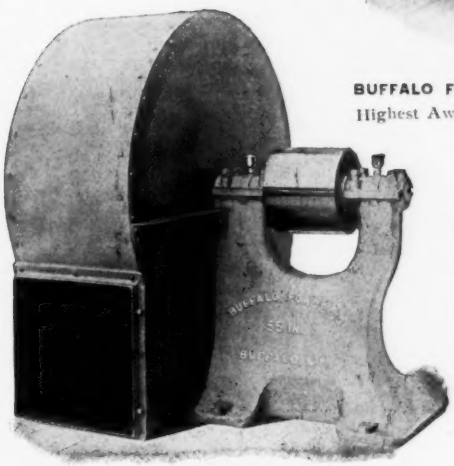
ALL TYPES OF CRANES.

Electric, Compressed Air and Hand Power.

EXPORT BUSINESS SOLICITED. SEND FOR CATALOGS.



BUFFALO FORGE CO., AUTOMATIC ENGINE.
Highest Award and Gold Medal at Omaha, 1898



BUFFALO TUMBLING BARREL EXHAUSTER

Tumbling Barrel Exhausters are easily applied, thoroughly efficient, and change casting cleaning rooms from a death-dealing pestilence to a comfortable working apartment.

Send for details.

Our 400 Page Calalogues tell all about these machines, applications, etc.; also Fan System of Heating Foundries, etc.

◆◆

Buffalo Forge Company,

BUFFALO, N. Y.

BUFFALO CUPOLA BLOWER.

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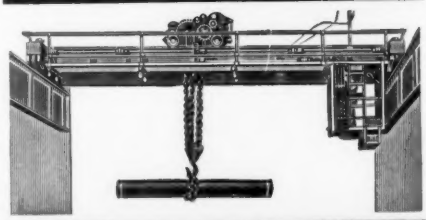
Honest Advertising

demands that a Journal should treat every advertiser alike . .

THE FOUNDRY **has but one rate. No reduction to Advertising Agencies . . . . . .**

Full Page, - per month,		$25.00
Half " - "		15.00
Quarter Page,	"	8.50

CRANES AND HOISTING MACHINERY



ELECTRICAL STEAM BELT AND HAND POWER

THE CASE MFG CO

COLUMBUS, OHIO.

THE DOMHOFF & JOYCE CO.

PIG IRON and COKE.

702 Fisher Building,
CHICAGO. CINCINNATI.

F. A. GOODRICH & CO.

Incorporated

PIG IRON, STEEL, COKE, ETC.

Detroit, Mich.

M. A. HANNA & CO.,

COAL, IRON ORE
and PIG IRON.

Cleveland, Ohio.

THOMAS A. MACK,

PIG IRON,

Cincinnati, - - Ohio.

C. L. PEIRSON & CO.,

PIG IRON and COKE.

Foundry Mixtures a Specialty.

BOSTON. NEW YORK

PILLING & CRANE,

PIG IRON and COKE,

Carnegie Building,
PITTSBURG, PA.

Girard Building,
PHILADELPHIA, PA.

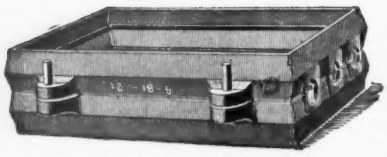
ROGERS, BROWN & CO.

CINCINNATI, CHICAGO,
BUFFALO,
PHILADELPHIA, NEW YORK,
ST. LOUIS
PITTSBURG, CLEVELAND.

STEVENSON, FIELD & CO.

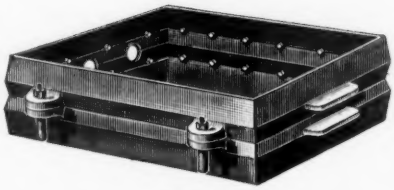
PIG IRON and COKE,

Columbus, O. St. Louis, Mo.



HORIZONTAL LIGHT RIBBED.

Ribs in Beveled Flasks add to the weight and obstruct ramming—do you want them? You are the Doctor!



PORCUPINE.
(PAT. APPLIED FOR.) Made in 1898.

State Size. Ask for Price.

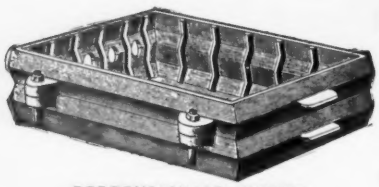
Estate of Oscar Barnett.

LONG DISTANCE PHONE 1045.
ESTABLISHED 1845.

NEWARK, N. J., U. S. A.

These Flasks are not milled with emery wheels and thrown together, but interchange and are perfectly fitted.

Makers of Everything for a Brass Foundry



PERPENDICULAR RIBBED.
DEMEREST'S PATENT, 1855.

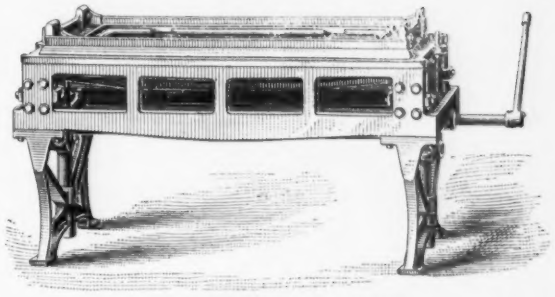
OSCAR BARNETT'S OLD RELIABLE
(Standard Beveled Style.)
IT LEADS.
NOT RIBBED.
Our own foundry insures prompt shipment. Faces planed level; don't rock.

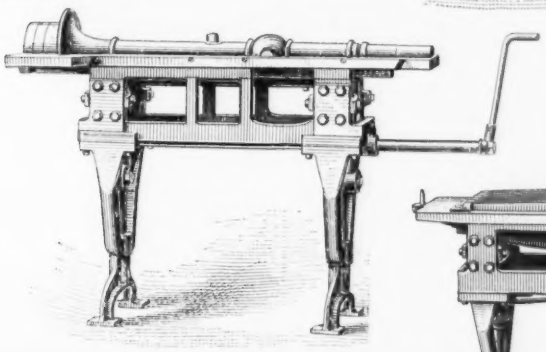
STRAIGHT SIDE, BEAD AT TOP, BOTTOM AND PARTING.

THE PRIDMORE MOLDING MACHINES

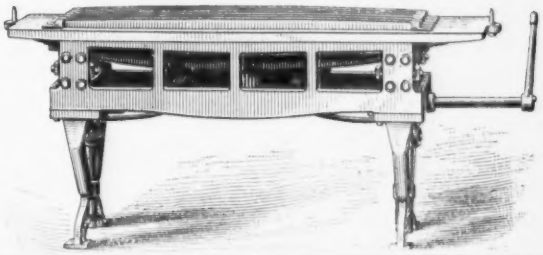
are built according to one principle, and that is the correct principle.

They are built in several styles, and many sizes of each style. There are shown herewith three sizes of one style.





EDWARD J. ETTING,
LAND TITLE BLDG., PHILADELPHIA, PA.
Agent for Eastern Pennsylvania, Western New Jersey, Delaware and Maryland.
EUROPEAN AGENCY, Pridmore Molding Machine, 39 VICTORIA ST., LONDON, S. W., ENG.

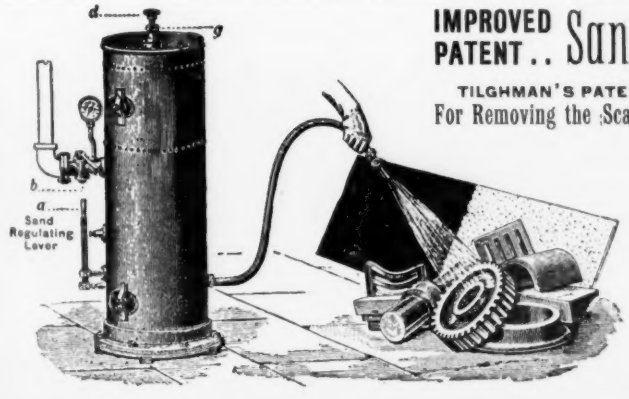


HENRY E. PRIDMORE,
S. E. Cor. 19th and Rockwell Sts., CHICAGO.

WE HAVE IT!
THE FINEST SERVICE BETWEEN **Detroit and Cincinnati**
VIA
LAKE SHORE–BIG FOUR LINE

Through Trains with Parlor and Sleeping Cars leave Detroit from foot of Brush Street, landing you direct in **Grand Central Union Station,** Cincinnati. Positively the only line avoiding depot transfers to any point South.

WARREN J. LYNCH, Pass. Traffic Manager, CINCINNATI. H. J. RHEIN, General Agent, DETROIT.



IMPROVED PATENT.. Sand Blast Machinery

TILGHMAN'S PATENTS. MATHEWSON'S PATENTS.
For Removing the Scale from Iron and Steel Plates.

Cleaning Castings, Forgings, etc

Sole Agents for the West.
Geo. Nash & Co.,
24 So. Clinton St., CHICAGO.
Sole Agents for the East,
Edgar T. Ward & Sons,
23-25 Purchase St., BOSTON.
Send for Catalogue

YOUR IRON CONTRACTS

In making your contracts for 1899 for Lake Superior Charcoal Pig Iron, it would do no harm to take up the question of

"PIONEER,"
"ANTRIM,"
"ELK RAPIDS."

These three brands have given satisfaction in car and malleable work for years in the past and will continue to do so for years to come.

Superior Charcoal Iron Co

911, 912, 913 Michigan Trust Bldg.,
GRAND RAPIDS, MICH.

GLUTROSE CORE COMPOUND

Used in the Penna. R. R. foundries and other first-class foundries throughout the United States and Europe.

NO BLOWN CASTINGS.

Makes first-class Radiator Cores without Rods.

Send for Samples and Testimonials.

AMERICAN GLUTROSE WORKS

Penn Mutual Insurance Building,
PHILADELPHIA.

FOR SALE!

Foundry and Machine BUSINESS.

Pays $5,000 to $8,000 per Year.

=PRICE, $10,000=

BELOW INVENTORY PRICE.

In a large town near New York. Unexcelled shipping facilities. Books filled with good paying orders. Best of reasons for selling.

Will sell real estate with or without the business. Present force, 75 men, would remain. A rare chance to secure a long established business.

Several patented specialties.

Private and commercial references of the very best.

Address "BARGAIN,"

Care THE FOUNDRY. DETROIT, MICH.

Eberhardt's Patented Sprue or Gate Cutter

Dear Sir:—The machine fills the bill; am just delighted with it.
Yours truly,
Maryland Brass & Metal Works,
Baltimore, Md.

Price Low

THE MARSHALL & HUSCHART MACHY. CO.,
Chicago and Cleveland.
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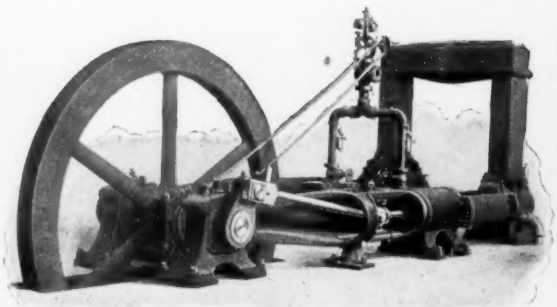

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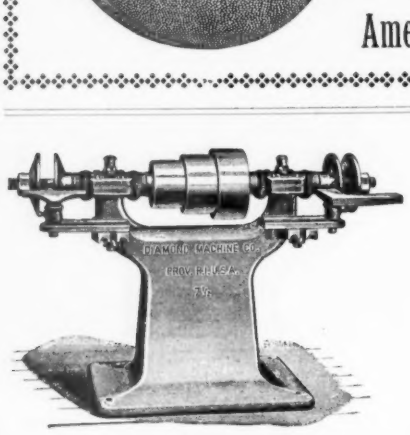

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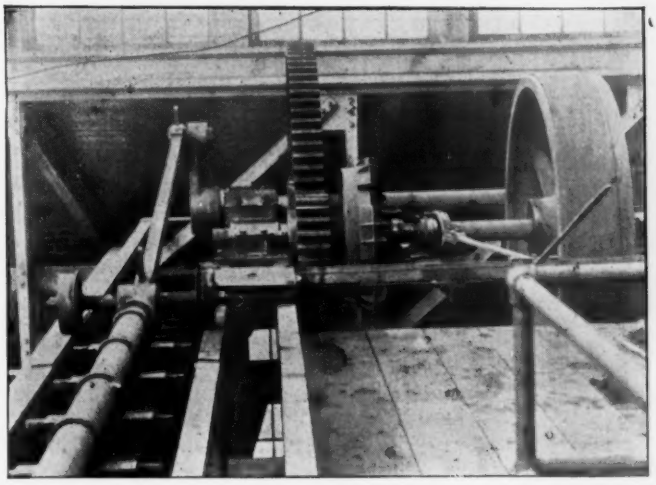

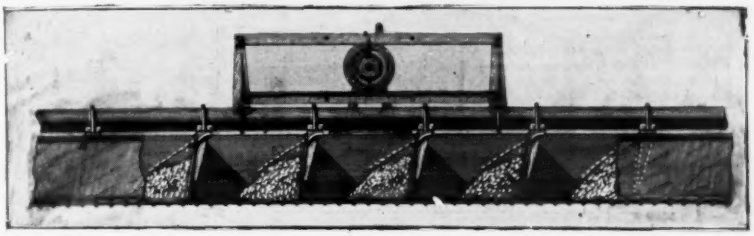

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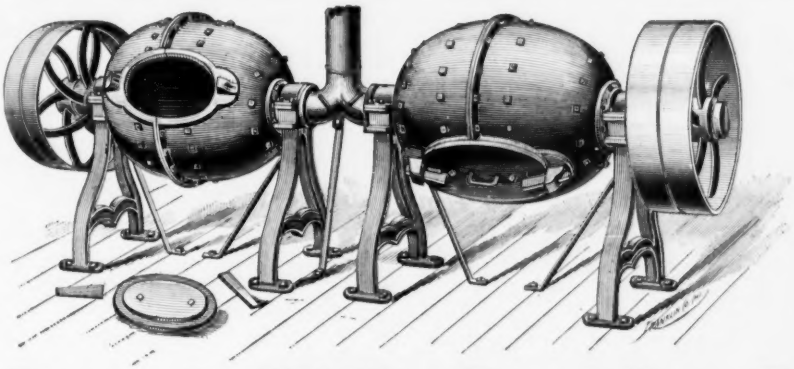

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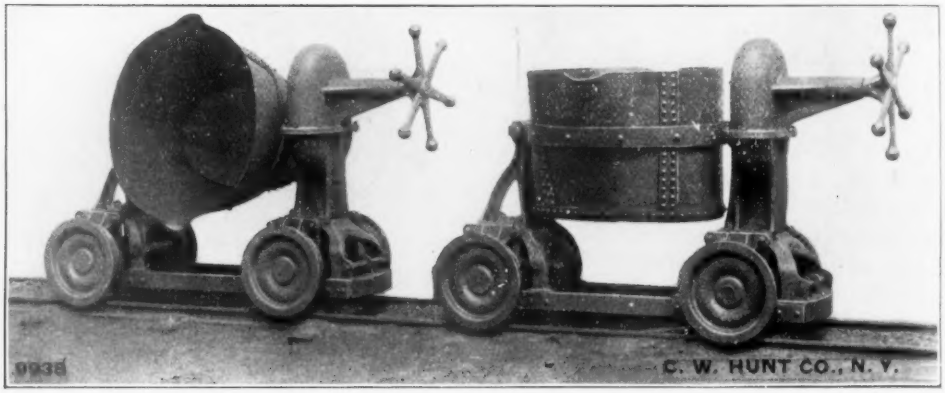

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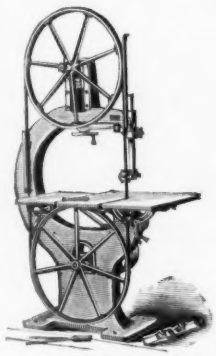

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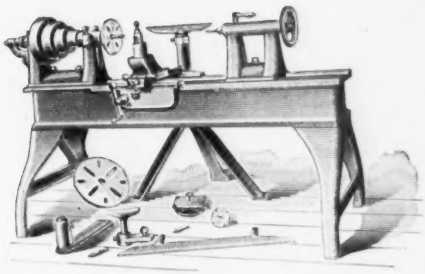

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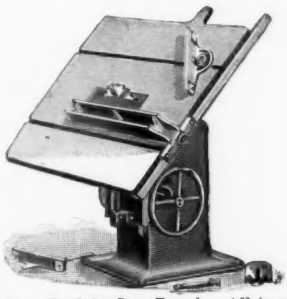

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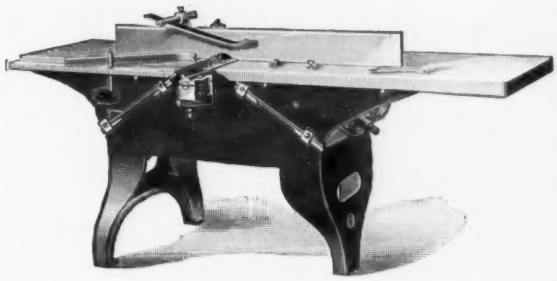

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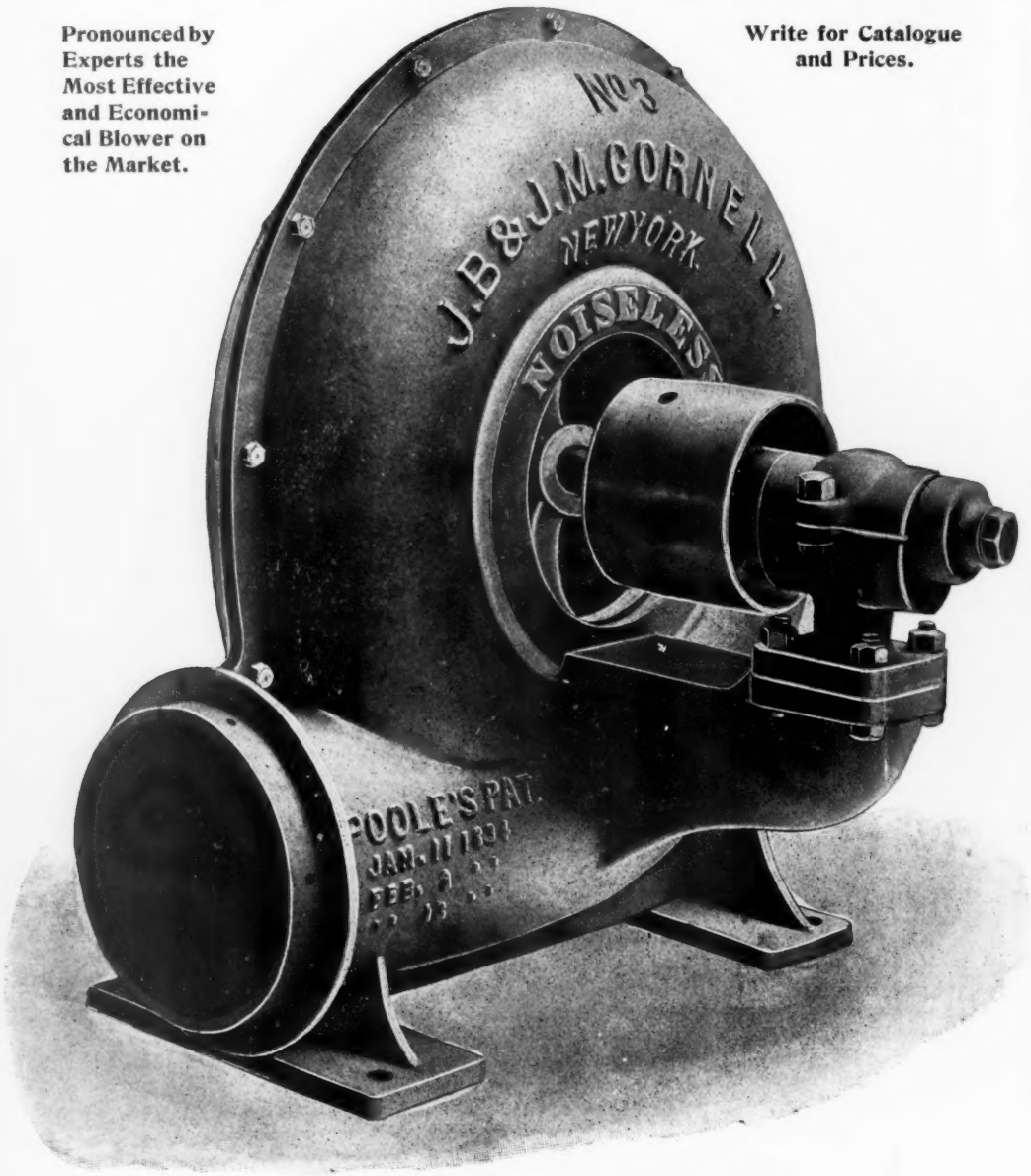

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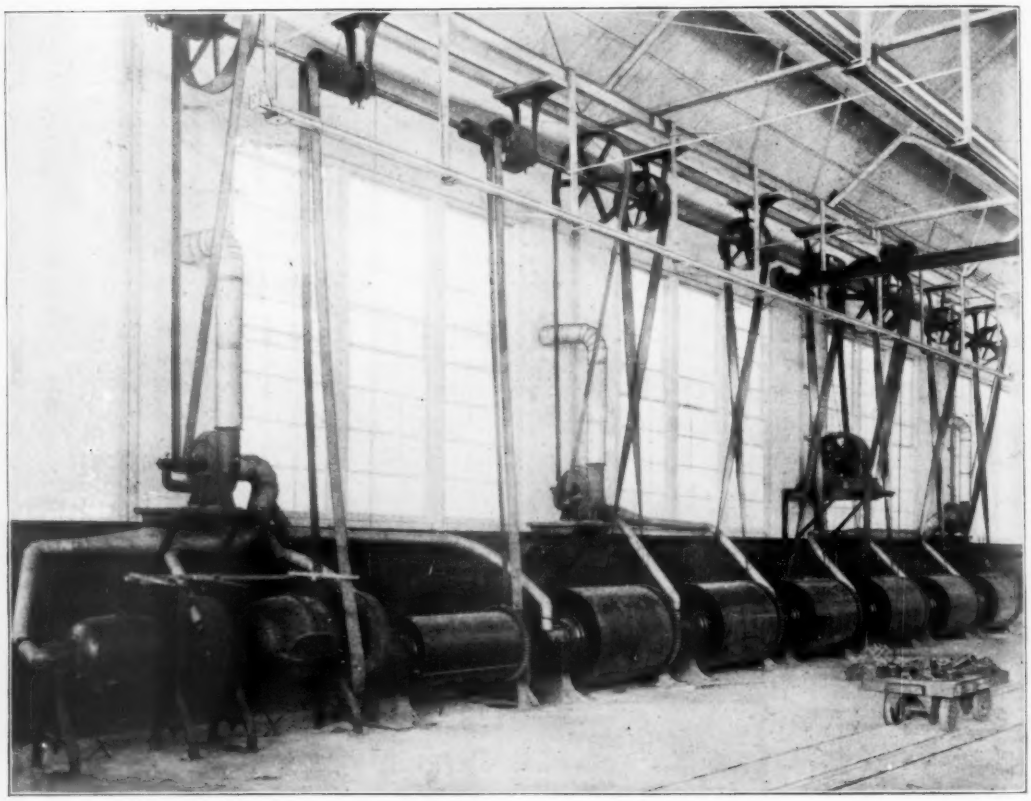

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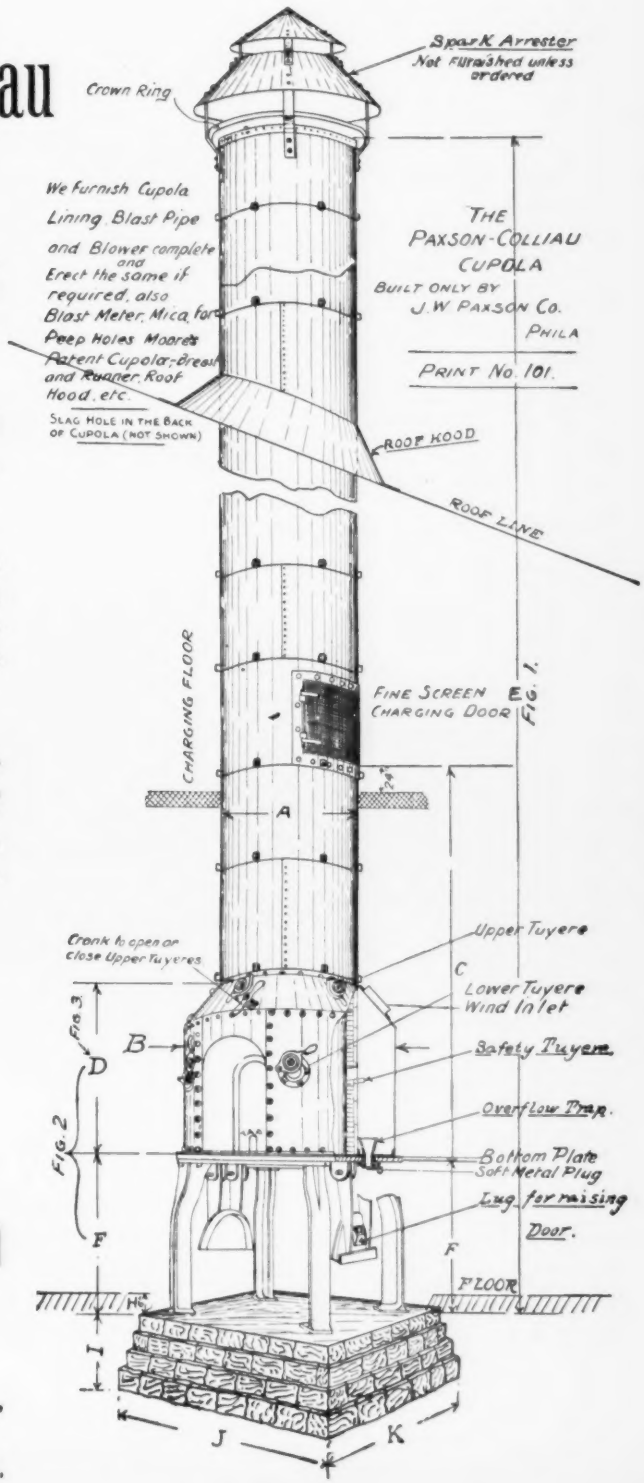

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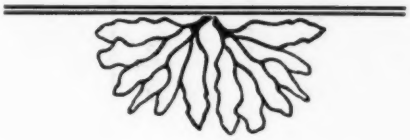

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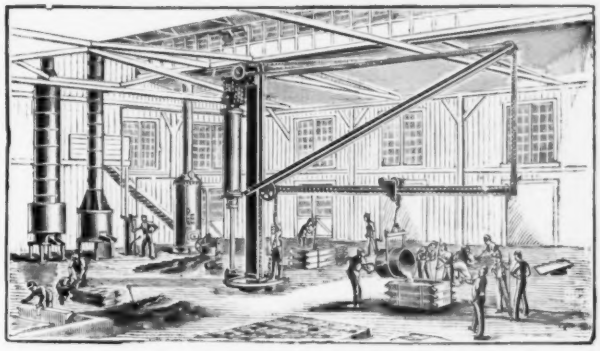
Old, Old Story, Over'n Over.

Wonder we don't get tired telling it. You may remember some months ago we mentioned the fact that the Benj. Atha & Illingworth Co., Newark, N. J., after using the Ridgway Crane eight years alongside of other sorts were so well satisfied that the Ridgway Crane was the best there is, that they equipped their new foundry entirely with Ridgway Cranes.

Now then, they are enlarging again, and here they are after more Ridgway Cranes.

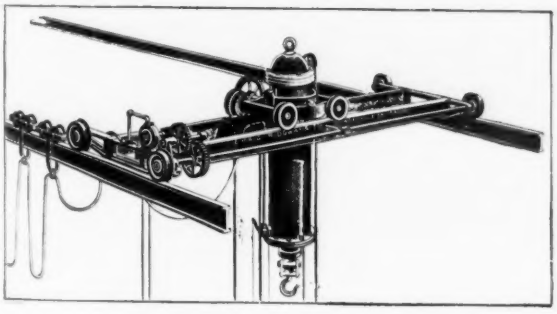


5-Ton Steam Hydraulic Crane in a Foundry.

These Ridgway Cranes do not do anything in this great plant but help the molders put up lots of work. The Benj. Atha & Illingworth Co. do not select Ridgway Cranes because they are cheap, or for any other reason than that they are the best—proven so by actual service in their own works. They wouldn't give us a testimonial for anything, but they keep right on ordering more cranes.

We merely mention the above in order that we may impress you we are not telling fairy stories. Write to the parties yourself and ask them what they know about Ridgway Cranes for turning out stuff in a foundry.

HYDRAULIC AIR HOISTS



Maybe you like the kind that goes "zip, bang!" This kind don't do that if the load slips or anything happens. A little oil in the piston rod perfectly controls its motion. But there is no use talking about it, since it is so easy to get one, hang it up and try it, and let it tell its own story in its own way. We might say the best shops get Ridgway Hydraulic Air Hoists.

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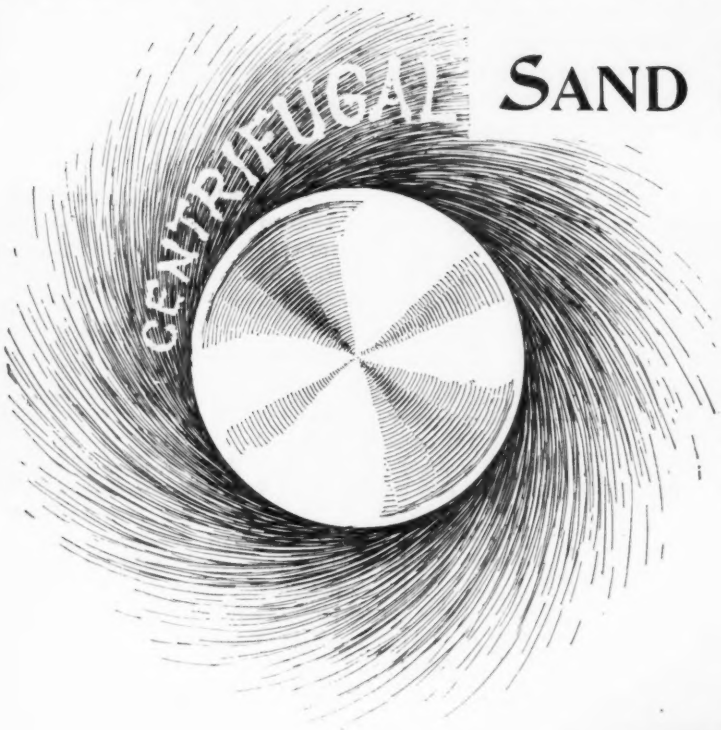
MODERN FOUNDRY MACHINERY



SAND MIXER.

Not an Experiment

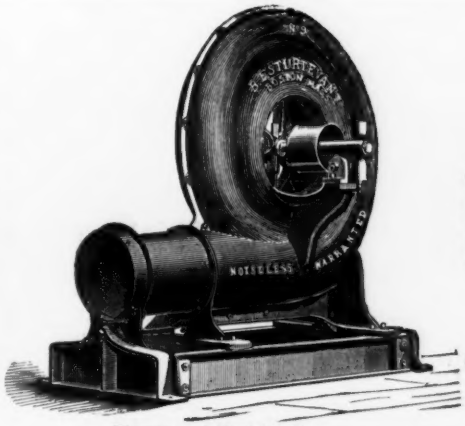
PRACTICAL.

ECONOMICAL.

EXPEDITIOUS.

NOTE. — The old-fashioned method of sifting sand has been to a large degree superseded in modern foundries by the Superior Centrifugal Method, and the machine illustrated herewith is a real labor saver.

Correspondence Is Solicited.



Blower on Adjustable Bed.

THE STURTEVANT STEEL Pressure Blowers,

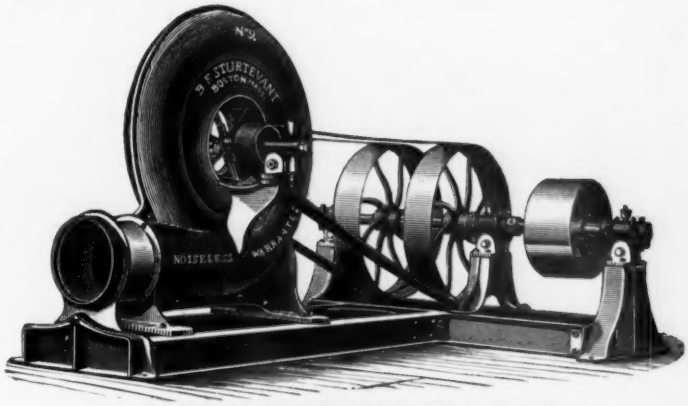
—FOR—

Cupola Furnaces and Forge Fires.

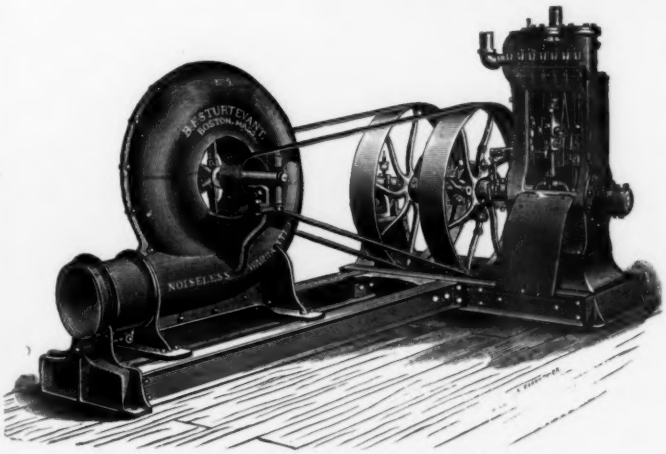
BLOWERS

Furnished without Bed with Separate Countershaft

BLAST GATES



Blower on Adjustable Bed with Combined Countershaft.



Blower on Adjustable Bed with Double Enclosed Engine.

BLOWERS

WITH

THE STURTEVANT

Direct Connected

Electric Motors

Send for Catalogue.

B. F. STURTEVANT CO.,

BOSTON MASS.

131 Liberty Street, NEW YORK, 135 N. Third St., PHILADELPHIA.
16 S. Canal St., CHICAGO. 75 Queen Victoria St., LONDON.

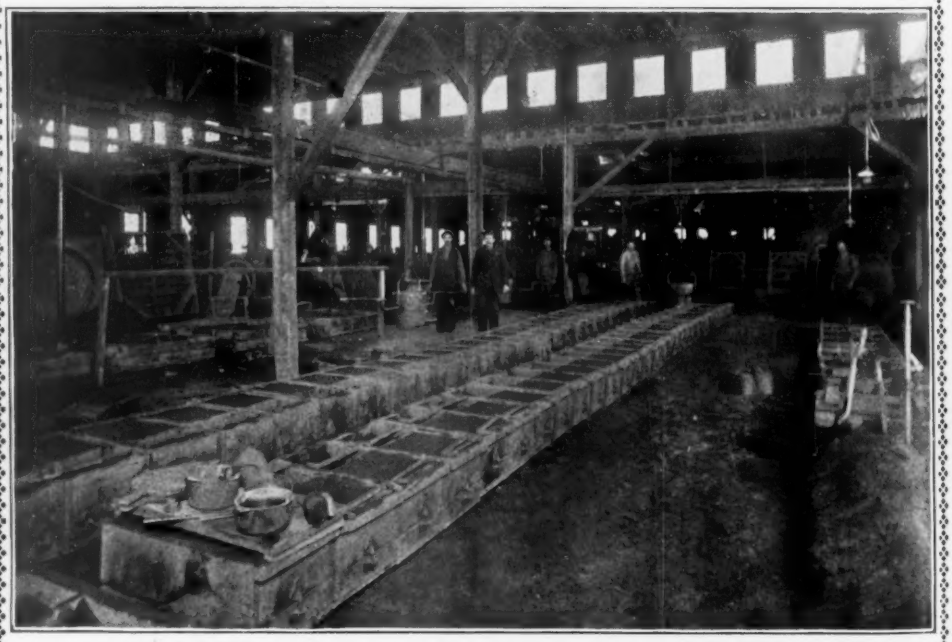
STOCK CARRIED AT BRANCHES.

Don't run a Man-killing shop!

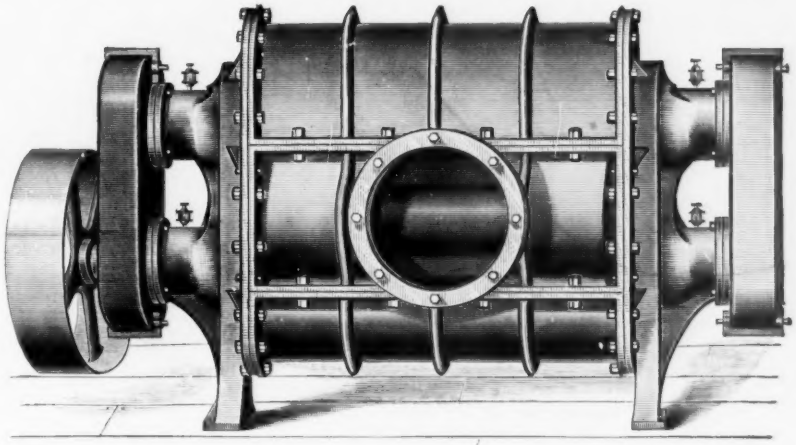
YOUR MEN will do more work the easier you make it for them to get around. Think of the labor it takes to lug your iron from one end of the shop to the other. Do you blame a good mechanic for avoiding working in such a shop? Carrying iron is only one thing that can be done on a trolley track. Sand, flasks, iron, castings, in fact, anything that's got to go out or in is transported with equal dispatch.

THE COBURN TROLLEY TRACK has a high efficiency combined with low cost of installation and operation. Tell us the size of your foundry, the amount of iron you want to handle, and we will furnish you an estimate of equipping your shop

Coburn Trolley Track Mfg. Co., Holyoke, Mass.



The Green Rotary Pressure Blower



Working parts are two perfectly balanced impellers, mounted on the best steel shafts, running in bronze bushes, detachable journal bearings, cut gearing at both ends of the Blower enclosed in oil-tight casing.

Weighs less, occupies less space, costs less for freight than any other POSITIVE BLOWER in existance.

FOUNDRY BLOWERS

High Pressure Blowers

GAS EXHAUSTERS

Exhausters for Hot Gases

The GREEN Gives the Most Value for a $.

Wilbraham Baker Blower Co

2518 Frankford Ave. PHILADELPHIA, PA.

Sales Agents: **Frazer & Chalmers, Inc.** CHICAGO, ILL., and BRANCH HOUSES.

Ayers is the Fellow

WHO has been digging sand for nearly a quarter of a century. A good many years, isn't it, to dig and dig and suit every . . . foundryman who comes along, every kind of work that turns up.

A good many years' of experience that goes direct to our customers.

You had better look ahead for your winter's supply. Just the ideal time of the year to ship now. Sand is in fine condition and railroads have more time at present than they will have when coal and wheat take their cars.

I have **Crude Plastic Fire Clay** that is as perfect around the cupola as **Zanesville Molding Sand** is in the foundry, and mixed with our Bank Fire Sand, is a perfect lining for ladles and cupola.

H. S. VROOMAN,
Western Agent,
220 W. 20th Street,
CHICACO.

E. M. AYERS
Market Block,
ZANESVILLE, OHIO.

DIRECTORY OF LEADING PIG IRON DEALERS.

MATTHEW ADDY & CO.

CINCINNATI, ST. LOUIS.

Agencies,

Chicago, Detroit, New York,

Philadelphia, Pittsburg.

DAYTON COAL & IRON CO.

(Limited)

PIG IRON,

Dayton, Tenn. Cincinnati, Ohio.

DECAMP BROS. & YULE,

Pig Iron and Coke.

Sole Agents McNair & DeCamp's

MISSOURI

MALLEABLE BESSEMER PIG IRON.

Fullerton Building, St. Louis.

THE DOMHOFF & JOYCE CO.

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702 Fisher Building,

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F. A. GOODRICH & CO.

Incorporated

PIG IRON, STEEL, COKE, ETC.

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M. A. HANNA & CO.,

COAL, IRON ORE

and PIG IRON.

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THOMAS A. MACK,

PIG IRON,

Cincinnati, - - Ohio.

COLUMBUS, O. CHICAGO, ILLS.

MILLER, WAGONER, FIESER & COMPANY.

PITTSBURGH, PA.

J. J. MOHR,

Foundry, Forge, Charcoal and Bessemer

PIG IRON,

Bullitt Building, Philadelphia, Pa.

PICKANDS, BROWN & CO.,

Manufacturers, Importers and Dealers in

PIG IRON AND IRON ORE.

Rookery Building, CHICAGO.

C. L. PEIRSON & CO.,

PIG IRON and COKE.

Foundry Mixtures a Specialty.

BOSTON. NEW YORK

PILLING & CRANE,

PIG IRON and COKE.

Carnegie Building,
PITTSBURG, PA.

Girard Building,
PHILADELPHIA, PA.

ROGERS, BROWN & CO.

CINCINNATI, CHICAGO,

BUFFALO,

PHILADELPHIA, NEW YORK,

ST. LOUIS

PITTSBURG. CLEVELAND.

STEVENSON, FIELD & CO.

PIG IRON and COKE.

Columbus, O. St. Louis, Mo

We Guarantee..

That one man with one of our **PNEUMATIC HAMMERS** can do more and better work than four men working in the ordinary way.

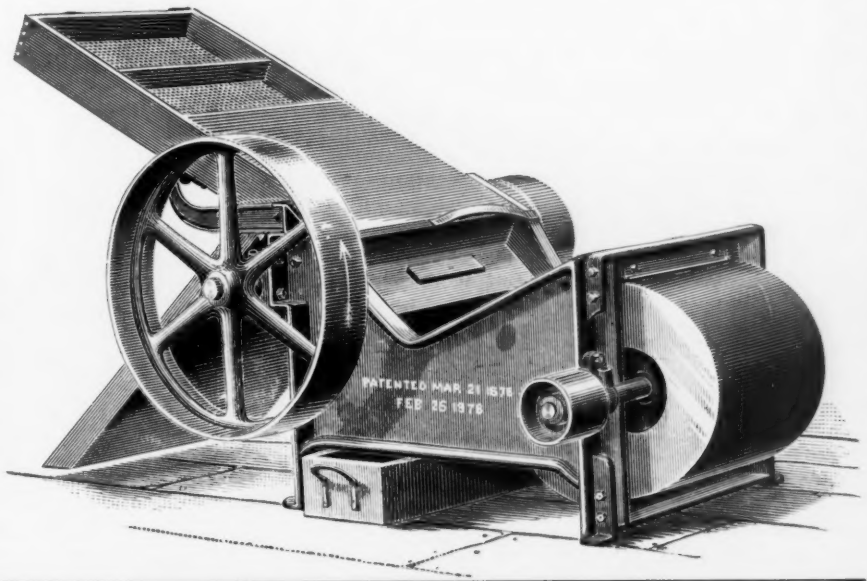
These same Hammers are also especially adapted for calking boilers and beading flues.

We also manufacture the best Air Drill on the market, and our Air Hoist and Compressors are especially designed for foundry work.

All tools sent on ten days' trial, subject to approval and are guaranteed for one year.

Chicago Pneumatic Tool Co.,

635 Monadnock Building, CHICAGO, ILL.



This is the Machine!

You have a common laborer.

Let him shovel your cinders and general refuse into this machine.

While he is doing other work, the machine is separating the iron from the dirt.

What before was worth nothing to you now becomes a source of revenue.

That is the testimony of such well known concerns as

KANSAS CITY CAR & FOUNDRY CO.
S. WOLF MFG. CO.
NATIONAL MALLEABLE CASTINGS CO.
GRIFFIN WHEEL CO.
SULZER BROS.

Follow their example. It is the only way you can keep up to date.

Audubon Machine Works,

Printed matter relating to our Separator to be had for the asking.

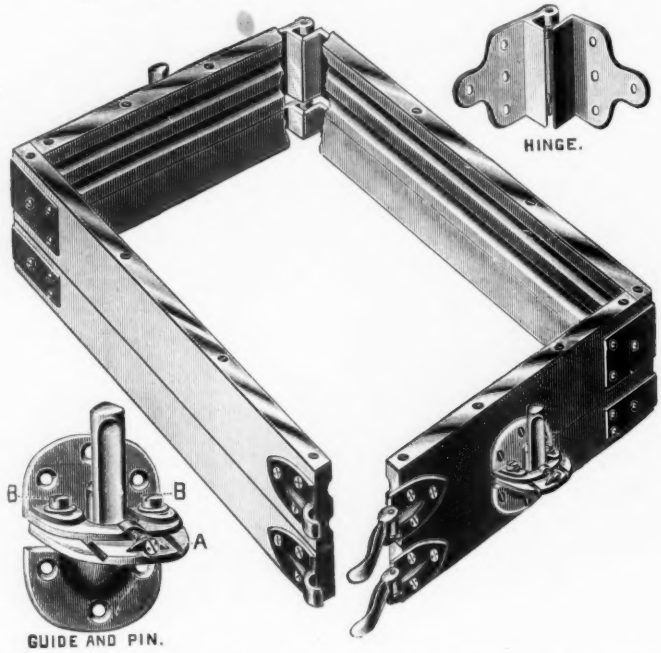
NEW HAVEN, CONN., U. S. A.

Stearns Improved Snap Flask

Cheaper Than You Can Make Your Own.

The large "V" shaped pins with corresponding bearings insure a level lift of the cope, enabling comparatively inexperienced help to mold difficult patterns.

The inner edges of the malleable iron hinge are beveled, bringing the corners perfectly true. The flasks are made of whitewood—light in weight, yet stiff and strong, edges and corners bound with iron.



These sizes, which are inside measurement, with 2-inch nowel and 3-inch cope, are kept in stock:

No.	Sizes.	No.	Sizes.	No.	Sizes.	No.	Sizes.
1	9x13	8	10x13	15	11x13	22	12x13
2	9x14	9	10x14	16	11x14	23	12x14
3	9x15	10	10x15	17	11x15	24	12x15
4	9x16	11	10x16	18	11x16	25	12x16
5	9x17	12	10x17	19	11x17	26	12x17
6	9x18	13	10x18	20	11x18	27	12x18
7	9x19	14	10x19	21	11x19	28	12x19

PRICE, $2 50 Each. Special Sizes furnished at an advance of **25** cents, net, each.

The metal furnishings, only, will be sold to parties desiring to make up their flasks. **Price, $1.50 per set.**

E. C. STEARNS & COMPANY, Syracuse, N. Y.

Makers of STEARNS BICYCLES and Manufacturers of Hardware.

CRUCIBLES.

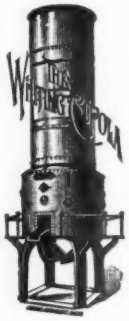
McCULLOUGH-DALZELL COMPANY

PITTSBURG, PA.

Whiting Foundry Equipment Co.

GENERAL OFFICE AND WORKS; HARVEY, ILL., U.S.A. (CHICAGO SUBURB.)
CHICAGO OFFICE: 1543 MARQUETTE BUILDING.

CUPOLAS
TUMBLERS
LADLES
SIFTERS



AIR HOISTS
RECEIVERS
TURNTABLES
TRUCKS, ETC.

ENGINEERS and DESIGNERS of COMPLETE PLANTS
For the Manufacture of

Cast Iron Chilled Car Wheels

(WHITING PATENT SYSTEM.)

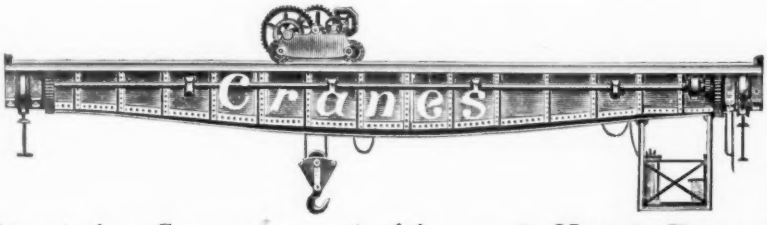
Cast Iron Pipe

(GAS and WATER.)

Malleable and Steel Castings

OUR SPECIALTY—

ALL TYPES OF CRANES.

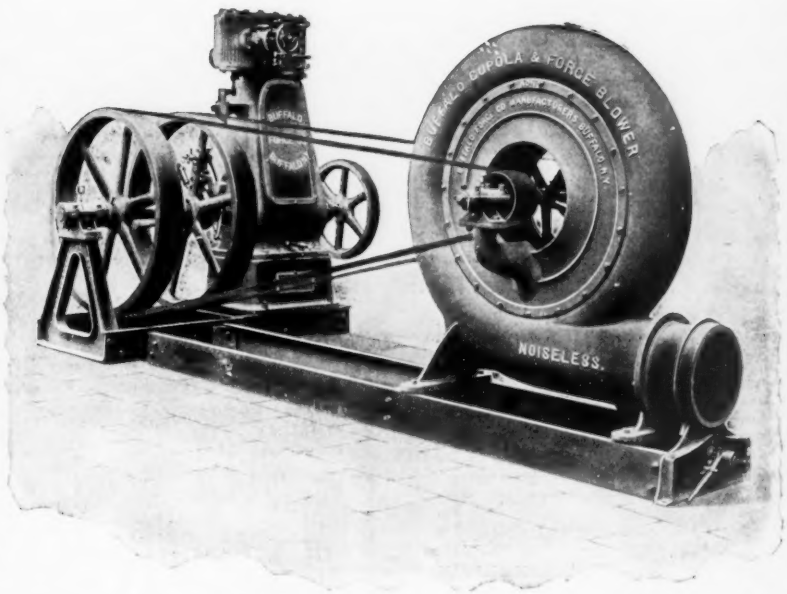


Electric, Compressed Air and Hand Power.

EXPORT BUSINESS SOLICITED. SEND FOR CATALOGS.

BUFFALO CUPOLA BLOWERS.

BUFFALO TUMBLING BARREL EXHAUSTERS.



Buffalo Steel Pressure Blower on Adjustable Bed, with Combined Engine and Countershaft.

Buffalo Forge Company,

BUFFALO, N. Y., U. S. A.

The Buffalo Fan System of Heating and Ventilating Foundries, Machine Shops, and all Large Buildings.

The Buffalo Forge Company Engine for Select Service. Highest Award and Gold Medal, Omaha, 1898.

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Trade Journals

have the habit of charging advertisers whatever they can get

THE FOUNDRY has long condemned such practices as being distinctly unfair. For years past it has published its rates .. where everybody could see them.

Full Page, - per month,		$25.00
Half " - "		15.00
Quarter Page, "		8.50

As these rates are made with a view of giving the best service for the least money, no reductions or commissions can be offered advertising agencies.

Advertisements may be discontinued at any time.

The Foundryman's Woes.

ALONG with good times the foundryman is treated to several other things. Just when he is thinking about raising the price of his castings, the pig iron men shove up the price of pig iron. The Connellsville people, seeing that everything else is going up, add another quarter to the cost of their coke.

Then, when the foundryman has got all of these new figures crammed into his head and begins to understand just what they mean to him, along comes the news that Plumbago or Silver Lead has reached such a price that he cannot afford to use it.

Fortunately there is a remedy for the high price of Plumbago. It is known as **"Radiant,"** and foundrymen who have used it for years, say it is the best blacking that ever came down the pike.

"Radiant" is good for any kind of castings, from the lightest stove plate to the heaviest chunks.

The price of **"Radiant"** is right. Barrels of 400 pounds can be had for 3c a pound. On large orders we allow a discount.

One other woe of the foundryman. If he uses cores, his place can be smelled for blocks around. This annoys the neighbors and his workmen, too. The latter can't do what they ought to. Whether cores are made with Rosin, Flour, Oil or Molasses, the odor is there just the same.

What is worse, in complicated work there is loss from the blowing, ill-venting and breaking of cores.

This loss is much greater than the cost of the core.

After long and costly experiments, we have succeeded in producing **"Coreka,"** a liquid that will, through its use, practically insure you against all loss on account of defective cores.

"Coreka" is odorless. There is no smoke during casting. There is no choking or blinding of workmen, and these can get through their work a great deal quicker and better.

"Coreka" makes a porous core. A **"Coreka"** core can't blow.

The price of **"Coreka"** is 25 cents per gallon. A gallon goes further than a quarter's worth of any other core material.

You get better cores with **"Coreka"** and the cost is lower, too. That is hitting two birds with one shot.

In **Cupola Blocks** and **Fire Brick**, we will supply you with what you need. Along with the right kind of fire brick, we will send you the right kind of **Fire Clay.** Write us for prices, delivered in your own town.

Cupolas and **Blowers** we can ship in all sizes. Many foundries have put in larger ones; we took the old ones in trade. These you can have at your own price. Some of them are as good as new, too.

Our foundry supplies stand in a class by themselves. Send us your address and our catalogue will go to you in the first mail.

The J. D. Smith Foundry Supply Co., CINCINNATI, OHIO.

Clinton Iron & Steel Co.

"FAIR DEALING" Their Motto.

MANUFACTURERS OF

"CLINTON" AND "HECTOR"

INSPECTED FOUNDRY IRONS . . . . .

ALSO

Sole Factors for DUNBAR STRONG IRON

In New York and New England.

FURNACES, PITTSBURGH.

NEW YORK OFFICE, No. 15 Cortlandt St.

Why deal with Commission people or Agents who give fancy names to Irons and know nothing about their manufacture

DEAL WITH THE MANUFACTURER DIRECT.

E. D. WHITE, President. A. H. GUTKES, Vice-Pres.
H. A. PERKINS, Secretary.

Brooklyn Fire Brick Works

T. K. BRICK, 1854. E. D. WHITE & Co., 1867.

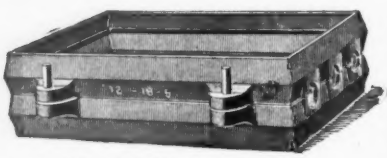
INCORPORATED 1893.

CUPOLA BLOCKS, FIRE SAND, FIRE CLAY, FIRE MORTAR, KAOLIN

AND ALL FIRE MATERIAL REQUIRED FOR FOUNDRY PURPOSES.

Send for Illustrated Catalogue and Prices.

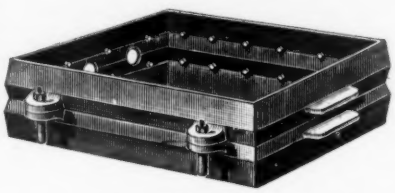
88 Van Dyke Street, BROOKLYN, N Y. CITY.



HORIZONTAL LIGHT RIBBED.

State Size. Ask for Price.

Ribs in Beveled Flasks add to the weight and obstruct ramming—do you want them? You are the Doctor!



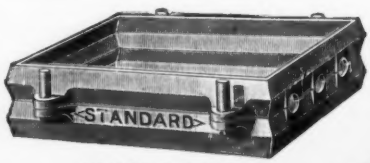
PORCUPINE.
(PAT. APPLIED FOR.) Made in 1898.

Estate of Oscar Barnett.

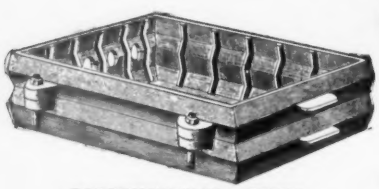
LONG DISTANCE PHONE 1045.
ESTABLISHED 1845.

NEWARK, N. J., U. S. A.

These Flasks are not milled with emery wheels and thrown together, but interchange and are perfectly fitted.



Makers of Everything for a Brass Foundry

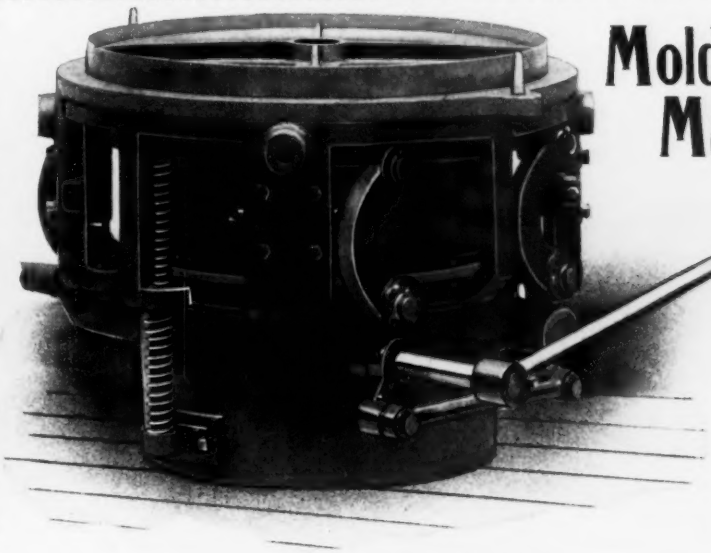


PERPENDICULAR RIBBED.
DEMEREST'S PATENT. 1855.

OSCAR BARNETT'S OLD RELIABLE
(Standard Beveled Style.)
IT LEADS.
NOT RIBBED.

Our own foundry insures prompt shipment. Faces planed level; don't rock.

STRAIGHT SIDE, BEAD AT TOP, BOTTOM AND PARTING.



Molding Machines

of this type from 18 ins. to 120 ins. in dia. increasing 2 ins. to the size, with draws of 6 or 8 inches.

MANUFACTURED BY

HENRY E PRIDMORE, S. E. Cor. Nineteenth and Rockwell Sts. CHICAGO, ILL.

EDWARD J. ETTING, Land Title Building, PHILADELPHIA, PA.
Agent for Eastern Pennsylvania, Western New Jersey, Delaware and Maryland.

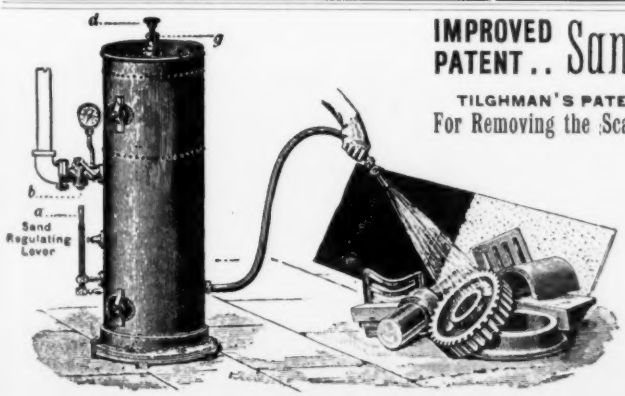
EUROPEAN AGENCY, 30 Victoria Street, LONDON, S. W., ENGLAND.

BE WISE

THE GOBEILLE PATTERN COMPANY

(PROMPT AND RELIABLE)

CLEVELAND, OHIO



IMPROVED PATENT.. Sand Blast Machinery

TILGHMAN'S PATENTS. MATHEWSON'S PATENTS.

For Removing the Scale from Iron and Steel Plates.

Cleaning Castings, Forgings, etc

Sole Agents for the West.

Geo. Nash & Co.,

24 So. Clinton St., CHICAGO.

Sole Agents for the East,

Edgar T. Ward & Sons,

23-25 Purchase St., BOSTON.

Send for Catalogue

GLUTROSE
CORE COMPOUND

Used in the Penna. R. R. foundries and other first-class foundries throughout the United States and Europe.

NO BLOWN CASTINGS.

Makes first-class Radiator Cores without Rods.

Send for Samples and Testimonials.

AMERICAN GLUTROSE WORKS

Penn Mutual Insurance Building,
PHILADELPHIA.

YOUR IRON CONTRACTS

In making your contracts for 1899 for Lake Superior Charcoal Pig Iron, it would do no harm to take up the question of

"PIONEER,"
"ANTRIM,"
"ELK RAPIDS."

These three brands have given satisfaction in car and malleable work for years in the past and will continue to do so for years to come.

Superior Charcoal Iron Co

911, 912, 913 Michigan Trust Bldg.,
GRAND RAPIDS, MICH.

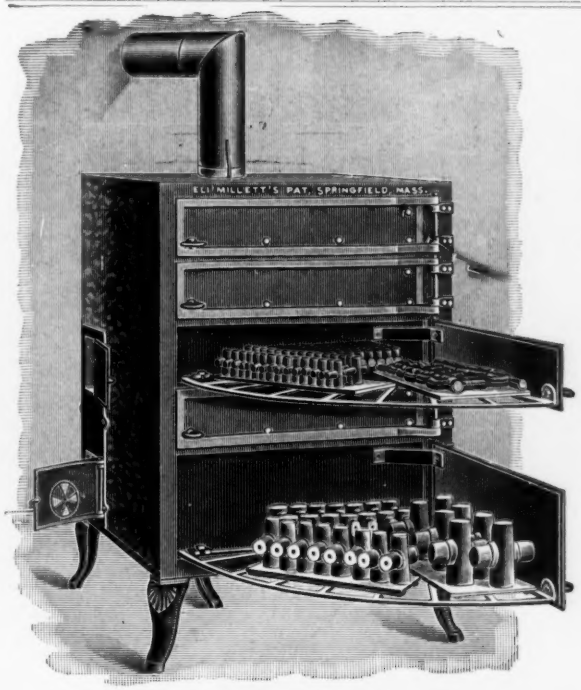
GETTING FAT

running a foundry is only accomplished by keeping away from worry. When a molder has the bad luck to have a little sand fall down somewhere or his mold . . scabs a little bit, you worry. Worry whether you had . . better break up the casting or send it out to the customer and stand a chance of it coming back rejected.

The up-to-date foundryman has long ago quit this kind of worrying. Whenever a casting has a sand hole, blow hole or any other kind of defect that only injures the appearance of the casting and nothing else, he takes a small amount of . . "Smooth On" Castings and repairs the defect.

"Smooth On" is a compound that becomes as hard as the casting itself, it has the same color as the casting and it will never come out. Thousands of leaky castings are made to stand the test imposed on them everyday simply by the use of "Smooth On." You can get a sample of it and some literature explaining its use by addressing a postal card to the "Smooth On" Mfg. Co.. 547-549 Communipaw Ave., Jersey City, N. J.

VREELAND TOMPKINS is the Chemist and Manager.



Millett's Patent Core Oven

Double Doors,
One closing the oven when the other is open.

THE BEST IN THE WORLD.

No Foundry using small Cores can afford to be without it.

Over two hundred in use.

Send for our new Catalogue giving names of those using them.

Millett Core Oven Co.

BRIGHTWOOD, MASS.

For Sale by THE J. W. PAXSON CO., Philadelphia, Pa., and THE S. OBERMAYER CO., Chicago, Ill.

The Sharp Detail

to be found on all really fine castings can only be preserved and brought out by the use of the Sand Blast.

Wire Brushes and Tumbling Barrels destroy the beauty of a nicely molded casting.

The King Improved Sand Blast is the cheapest apparatus of its kind on the market and is built to suit different kinds of work. Information about these machines will be fired your way upon receipt of your address.

THE KING IMPROVED SAND BLAST CO., Station C, DETROIT.

Bolland's "Encyclopedia of Founding"

is the latest book by that well-known author.
It is, as its name indicates, descriptive of all things connected with founding.
The book has 535 pages.
The price is $3.00 postpaid.

THE FOUNDRY PUBLISHING CO., Detroit.

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ENGINEERS AND CONTRACTORS,

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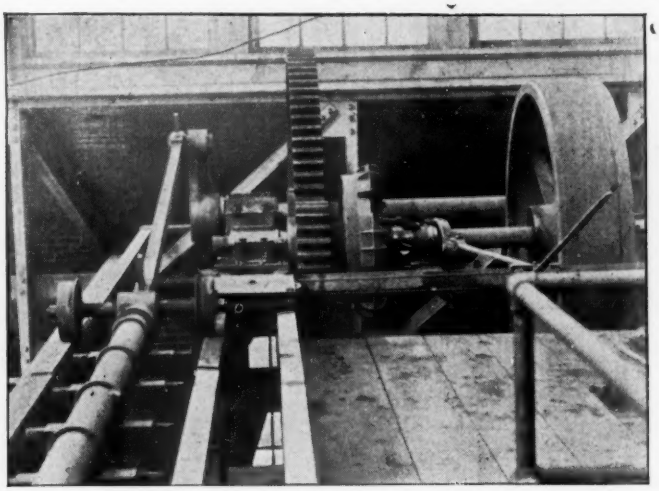
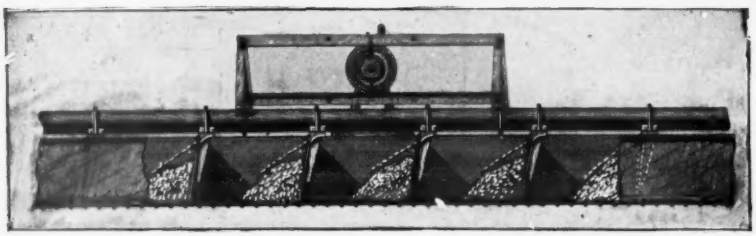
ELEVATING AND CONVEYING MACHINERY.

RECIPROCATING CONVEYORS FOR TRANSPORTING SAND.

FEEDING AND MEASURING DEVICES FOR THE AUTOMATIC TEMPERING OF SAND.

SLOW SPEED, PERFECT DISCHARGE ELEVATORS.





Views of 230-foot Reciprocating Sand Conveyer at Westinghouse Air Brake Co.'s Foundry, . . Wilmerding, Pa.

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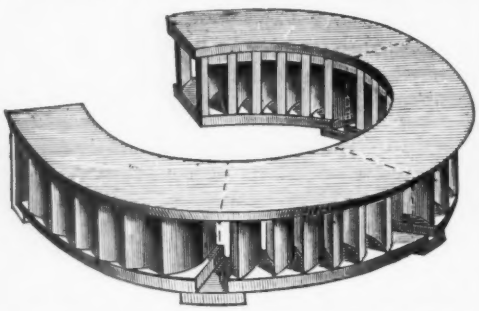
Complete Installations.

Adopted by the U. S. Navy Department.

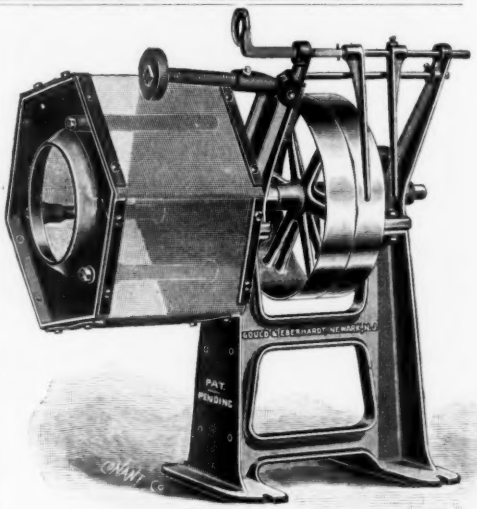


The combination of Sections of Tuyeres as placed in wall.

How About a new cupola now that "good times" are in sight. That old one, which you have been patching up since the panic of '93, cannot stand the strain much longer. If you want the best possible results as regards economy of fuel, rapid melting and a uniform strength of castings, not to mention the **lowest price**, it will pay you to investigate the **BLAKENEY**. The secret is in **perfect combustion.** The **continuous curved tuyeres** assure that in the highest degree. Let us send you a descriptive circular.

THE SPRINGFIELD CUPOLA CO.

SPRINGFIELD, OHIO.



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Messrs. Gould & Eberhardt, Newark, N. J.:

GENTLEMEN—As to the working of the Sand Sifter, it is *more than satisfactory*. After using a shaker, which not only shook the sand, but also shook itself apart periodically, it is a great relief, doing its work *quietly* and *thoroughly*, and we shall be pleased to recommend it to anyone you may refer to us. Yours truly,

BELL & FYFE FOUNDRY CO.

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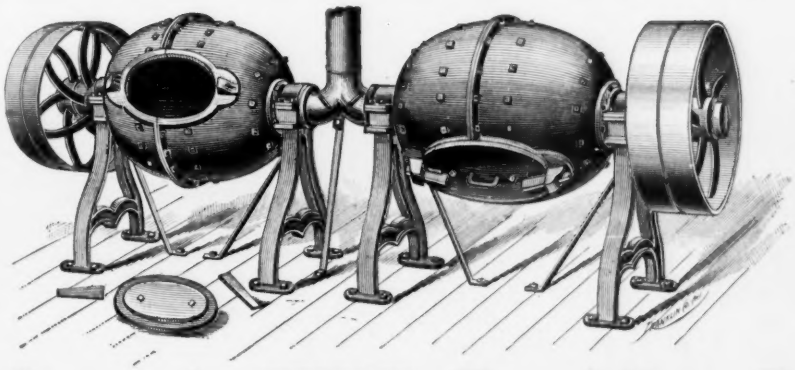
THE MARSHALL & HUSCHART MACHINERY COMPANY,

CHICAGO AND CLEVELAND, SELLING AGENTS.



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Stover's IMPROVED EXHAUST Tumbling Barrels

The Stover Egg Shaped Barrel does double the work of any other with less noise and power. It gives the contents a double motion or action—from ends to center and from side to center—causing a thorough mixing and rubbing together of all the parts contained therein, cleaning and polishing the contents better and quicker than any other form of barrel.

Sent on 30 days approval to any responsible manufacturer of light castings, malleable iron wire nails, or any other small articles that require cleaning and polishing.

For full particulars, address,

Stover Manufacturing Co.

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FARWELL'S **MOLDING MACHINES** Send for Catalogue

THE ADAMS COMPANY, DUBUQUE, IOWA

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ARE ALL RIGHT.

SO . ARE . PRICES.

Send for catalogue if interested. ·.· Send sample for Prices on Gray Iron Castings Our **Furnaces**, round steel shell, with drop grate, are up-to date.

HAVE YOU SEEN IT IMITATED?

WHY IS IT DONE?

Patent No. 580,205.

We make . . **Clamps, Boards** and **Other Supplies Castings, too.**

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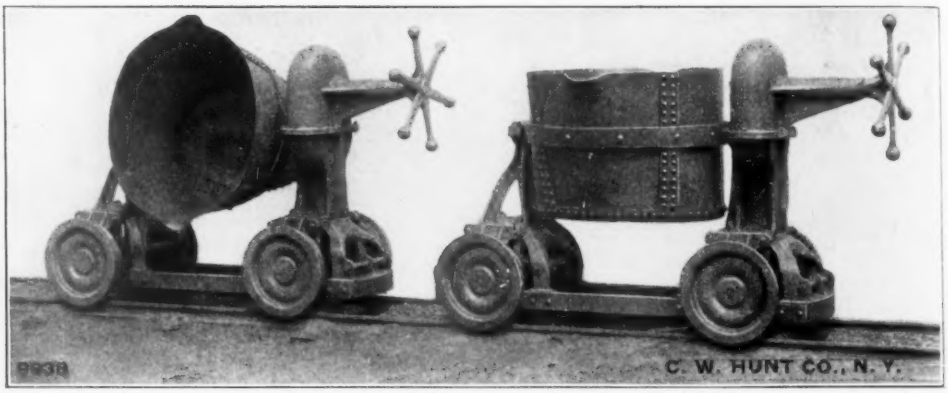

Ladle Cars, 1,500, 2,000, 3,000 Pounds Capacity.

Many foundrymen believe that these cars are not only more convenient to use in distributing molten metal, but are also safer than any overhead system of cranes or tackles. No accident has ever occurred in the use of these cars. The height of the top of the ladle above the rails, when upright, is 36 inches; for convenience in pouring into hand ladles, the shape of the body and the position of the trunnions are arranged so that the spout, when tipped, pours into a ladle 17 inches high. The gear for revolving the ladle, is our patent cam gear, that locks the ladle in every position, and possesses the remarkable feature of having both shafts revolve in the same direction. When the handles are moved, the ladle moves steadily in the same direction as the handles, but only one-twelfth as fast.

Our system of narrow-gauge tracks, switches, curves, turntables, etc., for use in manufacturing establishments and to accommodate such special cars as the above, is worthy of careful investigation by those who are apt to be interested. Catalogue No. 9904 contains useful data, besides thoroughly treating this subject. Copies will be mailed to those interested. Please address the works direct.

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Simple and Multiple Stage. Belt or Rope Driven. All Sizes. Special Patterns.

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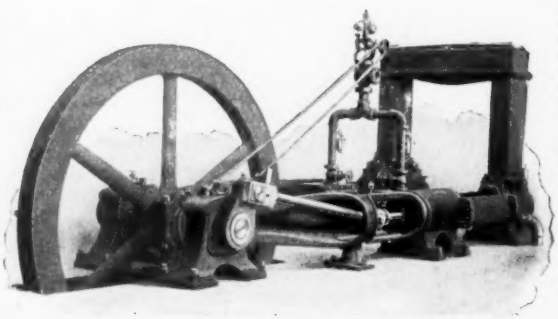

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FOR OPERATING

Pneumatic Chipping Hammers, Hoists, Casting Cleaners, Sand Blast Machines, Molding Machines and other appliances in foundry work.

COMPLETE OUTFITS FURNISHED AND INSTALLED.

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THE POOLE PRESSURE BLOWER

Pronounced by experts the Most Effective and Economical Blower on the Market.

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THE LATEST TESTIMONIALS.

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J. B. & J. M. CORNELL, 26th Street and 11th Auenue, New York City:

GENTLEMEN—Enclosed please find check to balance invoice for No. 3 Blower. The blower does the work at 3,000 revolutions and gives us between eight and nine ounces pressure at the cupola. The blower stands this speed all right and will probably run at a still higher rate without heating boxes.

My old blower, under the present conditions, would have done the work, but where yours has the advantage is in the decreased power taken to run it, which is a great consideration in time of low water.

Yours truly, GEORGE A. LANCE.

MESSRS. J. B. & J. M. CORNELL: NEWARK, N. J., January 24, 1899.

GENTLEMEN—It gives me pleasure to state that I have given the No. O Blower of your patent sent us, a careful and exhaustive test against a like-sized blower of a Standard make, running both at the same time, from the same shaft, and at exactly the same speed. Your blower gives a slightly higher pressure and fully double the volume of the other. This result was obtained by carefully measuring the area of the discharge openings for the blast from both Blowers and yours would supply an opening of twice the area of the other blower before showing a diminution in the pressure of the blast.

Very truly, JAMES P. WILSON, Supt., TIRRILL'S GAS MACHINE CO., 14 Commercial St., Newark, N. J.

Manufactured and Sold by **J. B. & J. M. CORNELL,** 26th St. and 11th Avenue, NEW YORK CITY.

EMERY WHEELS

FOR FOUNDRY USE MUST BE

FREE CUTTING AND DURABLE.

We make a Specialty of Wheels for Grinding Castings and will Guarantee Satisfaction.

Catalogue upon Application.

American Emery Wheel Works, PROVIDENCE, R. I.

No. 7½ GRINDER.

This Grinder

was designed by us for foundry use. One stove maker has 16 of them. The distance between wheels is 48 inches, diameter of spindle between flanges 1¾ inches or 2 inches, as ordered. Babbitted boxes with three ring oilers. Weight, 1200 lbs. If you want a good substantial grinder write us for circulars and prices.

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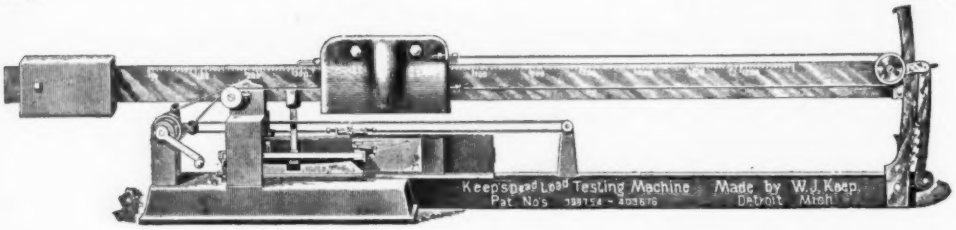

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AT A LOW PRICE. ✻

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FOUNDRY MOLDING MACHINES, STRIPPING PLATE MACHINES, PORTABLE, AIR-POWER, MACHINES,

USING WOOD OR METAL SPLIT PATTERNS, WITHOUT STRIPPING PLATES.

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FOR ALL PURPOSES.

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PORTABLE EMERY GRINDER

Take the tool to the work and save heavy handling.

WRITE US FOR CATALOGUE AND PRICES

Every Proprietor Superintendent Foreman Cupola Tender and Molder

should read the new book on **"The Cupola Furnace,"** written by EDWARD KIRK.

It has 350 pages, 78 illustrations, and treats of every subject connected with the cupola in a common sense way.

It tells how it is that some foundries have hot iron one day and dull the next.

It tells how dull iron is caused during different parts of the heat.

It tells about the lining, why it burns out, and how to keep it from doing so.

In short, the book tells of Cupola Practice in a practical way. There is not one bit of theory about it.

The price is **$3.50** prepaid.

THE FOUNDRY PUPLISHING CO., DETROIT.

U.S. TIN

is used in making brass and bronze castings; it makes a superior metal, sounder castings, more homogeneous in structure, richer color, better wearing metal, of higher surface lustre than alloy made with imported tin. U. S. TIN is to be used in same proportions as imported tin.

The Price is Much Lower.

The difference in price, the superiority of metal, and sounder castings should induce all users of metals to make comparative tests. We will send to responsible parties small lots of the U. S. TIN on approval, and if satisfactory, will make contracts covering a given time. Shall be pleased to correspond with all who may be interested.

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"Short Talks on Advertising."

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Paper binding, lithographed cover, 25 cents

Cloth and gold, gold top, uncut edges, $1.00

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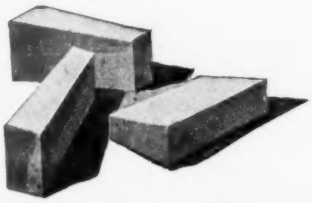
Have you ever seen the record

Made by blast furnace No. 1, Ensley, Alabama? This furnace ran continuously four (4) years and two (2) days and made 253,533 tons of pig iron.

The greatest record ever made by any furnace in the South.



This furnace was lined exclusively with "FRANKLIN CROWN" and "SLIGO" Fire Brick. The best on earth. This record is equal to double the amount of northern ore.

Garden City Sand Co., * * SECURITY BUILDING, CHICAGO.

Exclusive agents for the Northwest.

DO YOU MAKE LIGHT OR HEAVY

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IF SO, YOU SHOULD USE

McCORMICK'S

VULCAN BLACKING.

It makes as clear and smooth a casting as the best plumbago and better than the silver leads. Not an experiment—in use in the largest foundries. A trial will satisfy you of its value.

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We have other bricks a little lower in price than the **Davis Crown.** They are good in their place and will give the best of service where conditions do not require the very best.

We carry in stock **Cupola Blocks** for any ordinary cupola. If, in ordering, you will send us a sketch of your cupola, we will furnish a lining which will require no cutting to be put in place. This will save labor and worry all around.

Along with the Fire Brick, you will want some **Fire Clay.** You will want the very best, too. That is the kind we have. Don't lay a good fire brick with poor clay.

In **General Foundry Supplies** we lead the procession. Riddles, Shovels, Brushes, in fact, anything the molder needs to do a good job can be obtained of us. We guarantee the quality.

Don't forget our **Sea Coal.** We have the most modern machinery for manufacturing this product.

The Cleveland Facing Mill Company

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